MATHEMATICS 12^{th}

OBJECTIVE PART

It is Challenge that you can get 80+ Marks

1. **If $f(x) = x^2 - 2x + 1$, then $f(0) =$**
   (a) -1 (b) 0 (c) ✔ 1 (d) 2
2. **When we say that f is function from set X to set Y, then X is called**
   (a) ✔Domain of f (b) Range of f (c) Codomain of f (d) None of these
3. **The term "Function" was recognized by______ to describe the dependence of one quantity to another.**
   (a) ✔Lebnitz (b) Euler (c) Newton (d) Lagrange
4. **If $f(x) = x^2$ then the range of f is**
   (a) ✔ [0,∞) (b) (-∞, 0] (c) $(0, \infty)$ (d) None of these
5. **$Cosh^2x - Sinh^2x =$**
   (a) -1 (b) 0 (c) ✔1 (d) None of these
6. **$cosechx$ is equal to**
   (a) $\frac{2}{e^x+e^{-x}}$ (b) $\frac{1}{e^x-e^{-x}}$ (c) ✔ $\frac{2}{e^x-e^{-x}}$ (d) $\frac{2}{e^{-x}+e^x}$
7. **The domain and range of identity function, $I: X \to X$ is**
   (a) ✔X (b) +iv real numbers (c) –iv real numbers (d) integers
8. **The linear function $f(x) = ax + b$ is constant function if**
   $a \neq 0, b = 1$ (b) $a = 1, b = 0$ (c) $a = 1, b = 1$ (d) ✔ $a = 0$
9. **If $f(x) = 2x + 3$, $g(x) = x^2 - 1$, then $(gof)(x) =$**
   (a) $2x^2 - 1$ (b) ✔ $4x^2 + 4x$ (c) $4x + 3$ (d) $x^4 - 2x^2$
10. **If $f(x) = 2x + 3$, $g(x) = x^2 - 1$, then $(gog)(x) =$**
    (b) $2x^2 - 1$ (b) $4x^2 + 4x$ (c) $4x + 3$ (d) ✔ $x^4 - 2x^2$
11. **The inverse of a function exists only if it is**
    (a) an into function (b) an onto function (c) ✔ (1-1) and into function (d) None of these
12. **If $f(x) = 2 + \sqrt{x-1}$, then domain of $f^{-1} =$**
    (a)]2,∞[(b) ✔ [2,∞[(c) [1,∞[(d)]1,∞[
13. **$\lim_{x\to\infty} e^x =$**
    (a) 1 (b) ∞ (c) ✔ 0 (d) -1
14. **$\lim_{x\to 0} \frac{\sin(x-3)}{x-3} =$**
    (a) ✔1 (b) ∞ (c) $\frac{sin3}{3}$ (d) -3
15. **$\lim_{x\to 0} \frac{\sin(x-a)}{x-a} =$**
    (a) ✔1 (b) ∞ (c) $\frac{sina}{a}$ (d) -3
16. **$f(x) = x^3 + x$ is :**
    (a) Even (b) ✔ Odd (c) Neither even nor odd (d) None
17. **If $f: X \to Y$ is a function, then elements of x are called**
    (a) Images (b) ✔ Pre-Images (c) Constants (d) Ranges
18. **$\lim_{x\to 0} \left(\frac{x}{1+x}\right) =$**
    (a) e (b) ✔ e^{-1} (c) e^2 (d) $\sqrt{e}$
19. **$\lim_{x\to 0} \frac{a^x-1}{x}$ is equal to**
    (a) log_{e^x} (b) log_{a^x} (c) a (d) ✔ log_{e^a}

20. $\lim_{x\to 0}\frac{Sinx^{\circ}}{x} =$

(a) ✔ $\frac{\pi}{180^{\circ}}$ (b) $\frac{180^{\circ}}{\pi}$ (c) $180\,\pi$ (d) 1

21. A function is said to be continuous at $x = c$ if

(a) $\lim_{x\to c} f(x)$ exists (b) $f(c)$ is defined (c) $\lim_{x\to c} f(x) = f(c)$ (d) ✔ All of these

22. The function $f(x) = \frac{x^2-1}{x-1}$ is discontinuous at

(a) ✔1 (b) 2 (c) 3 (d) 4

1. L.H.L of $f(x) = |x-5|$ $at\ x = 5$ is

23. 5 (b) ✔0 (c) 2 (d) 4

24. The change in variable x is called increment of x. It is denoted by δx which is

(a) +iv only (b) –iv only (c) ✔ +iv or –iv (d) none of these

25. The notation $\frac{dy}{dx}$ or $\frac{df}{dx}$ is used by

(a) ✔Leibnitz (b) Newton (c) Lagrange (d) Cauchy

26. The notation $\dot{f}(x)$ is used by

(a) Leibnitz (b) ✔ Newton (c) Lagrange (d) Cauchy

27. The notation $f'(x)$ or y' is used by

(a) Leibnitz (b) Newton (c) ✔ Lagrange (d) Cauchy

28. The notation $Df(x)$ or Dy is used by

(a) Leibnitz (b) Newton (c) Lagrange (d) ✔ Cauchy

29. $\lim_{x\to a}\frac{f(x)-f(a)}{x-a} =$

(a) ✔ $f'(x)$ (b) $f'(a)$ (c) $f(0$ (d) $f(x-a)$

30. $\frac{d}{dx}(x^n) = nx^{n-1}$ **is called**

(a) ✔ Power rule (b) Product rule (c) Quotient rule (d) Constant

31. The derivative of a constant function is

(a) one (b) ✔ zero (c) undefined (d) None of these

32. The process of finding derivatives is called

(a) ✔Differentiation (b) differential (c) Increment (d) Integration

33. If $f(x) = \frac{1}{x}$ **, then** $f''(a) =$

(a) $-\frac{2}{(a)^3}$ (b) $-\frac{1}{a^2}$ (c) $\frac{1}{a^2}$ (d) ✔ $\frac{2}{a^3}$

34. $(fog)'(x) =$

(a) $f'g'$ (b) $f'g(x)$ (c) ✔ $f'(g(x))g'(x)$ (d) cannot be calculated

35. $\frac{d}{dx}\left(g(x)\right)^n =$

(a) $n[g(x)]^{n-1}$ (b) $n[(g(x)]^{n-1}g(x)$ (c) ✔ $n[(g(x)]^{n-1}g'(x)$ (d) $[g(x)]^{n-1}g'(x)$

36. $\frac{d}{dx}\left(3x^{\frac{4}{3}}\right) =$

(a) $4x^{\frac{2}{3}}$ (b) ✔ $4x^{\frac{1}{3}}$ (c) $2x^{\frac{1}{3}}$ (d) $3x^{\frac{1}{3}}$

37. If $x = at^2$ **and** $y = 2at$ **then** $\frac{dy}{dx} =$

(a) $\frac{2}{ya}$ (b) $\frac{y}{2a}$ (c) ✔ $\frac{2a}{y}$ (d) $\frac{2}{y}$

38. $\frac{d}{dx}(tan^{-1}x - cot^{-1}x) =$

(a) $\frac{2}{\sqrt{1+x^2}}$ (b) ✔ $\frac{2}{1+x^2}$ (c) 0 (d) $\frac{-2}{1+x^2}$

39. If $Sin\,\sqrt{x}$**, then** $\frac{dy}{dx}$ **is equal to**

(a) ✔ $\frac{cos\sqrt{x}}{2\sqrt{x}}$ (b) $\frac{cos\sqrt{x}}{\sqrt{x}}$ (c) $cos\sqrt{x}$ (d) $\frac{cosx}{\sqrt{x}}$

40. $\frac{d}{dx}sec^{-1}x =$

(a) ✔ $\frac{1}{|x|\sqrt{x^2-1}}$ (b) $\frac{-1}{|x|\sqrt{x^2-1}}$ (c) $\frac{1}{|x|\sqrt{1+x^2}}$ (d) $\frac{-1}{|x|\sqrt{1+x^2}}$

41. $\frac{d}{dx}cosec^{-1}x =$

(a) $\frac{1}{|x|\sqrt{x^2-1}}$ (b) ✔ $\frac{-1}{|x|\sqrt{x^2-1}}$ (c) $\frac{1}{|x|\sqrt{1+x^2}}$ (d) $\frac{-1}{|x|\sqrt{1+x^2}}$

42. Differentiating sin^3x $w.r.t$ cos^2x is

(a) ✔ $-\frac{3}{2}sinx$ (b) $\frac{3}{2}sinx$ (c) $\frac{2}{3}cosx$ (d) $-\frac{2}{3}cosx$

43. If $\frac{y}{x} = Tan^{-1}\frac{x}{y}$ then $\frac{dy}{dx} =$

(a) $\frac{x}{y}$ (b) $-\frac{x}{y}$ (c) ✔ $\frac{y}{x}$ (d) $-\frac{y}{x}$

44. If $tany(1 + tanx) = 1 - tanx$ show that $\frac{dy}{dx} =$

(a) 0 (b) 1 (c) ✔ -1 (d) 2

45. $\frac{d}{dx}(Sin^{-1}x) = \frac{1}{\sqrt{1-x^2}}$ is valid for

(a) $0 < x < 1$ (b) $-1 < x < 0$ (c) ✔ $-1 < x < 1$ (d) None of these

46. If $y = asin^{-1}\left(\frac{x}{a}\right) + \sqrt{a^2 - x^2}$ then $\frac{dy}{dx} =$

(a) $Cos^{-1}\frac{x}{a}$ (b) $Sec^{-1}\frac{x}{a}$ (c) ✔ $Sin^{-1}\frac{x}{a}$ (d) $Tan^{-1}\frac{x}{a}$

47. If $y = e^{-ax}, then y\frac{dy}{dx} =$

(a) ✔ $-ae^{-2ax}$ (b) $-a^2e^{ax}$ (c) a^2e^{-2ax} (d) $-a^2e^{-2ax}$

48. $\frac{d}{dx}(10^{sinx}) =$

(a) 10^{cosx} (b) ✔ $10^{sinx}.cosx.ln10$ (c) $10^{sinx}.ln10$ (d) $10^{cosx}.ln10$

49. If $y = e^{ax}$ then $\frac{dy}{dx} =$

(a) $\frac{1}{e^x}$ (b) ✔ ae^{ax} (c) e^{ax} (d) $\frac{1}{a}e^{ax}$

50. $\frac{d}{dx}(a^x) =$

(a) a^x (b) $e^x lna$ (c) ✔ $a^x.lna$ (d) $x^a.lna$

51. The function $f(x) = a^x, a > 0$, $a \neq 0$, and x is any real number is called

(a) ✔ Exponential function (b) logarithmic function (c) algebraic function (d) composite function

1. If $a > 0$,$a \neq 1$, and $x = a^y$ then the function defined by $y = loga^x$ $(x > 0)$ is called a logarithmic function with base

(a) 10 (b) e (c) ✔ a (d) x

52. $log_{a^a} =$

(a) ✔1 (b) e (c) a^2 (d) not defined

53. $\frac{d}{dx}log_{a^x} =$

(a) $\frac{1}{x}\log a$ (b) ✔ $\frac{1}{xlna}$ (c) $\frac{lnx}{xlnx}$ (d) $\frac{lna}{xlnx}$

54. $\frac{d}{dx}ln[f(x)] =$

(a) $f'(x)$ (b) $lnf'(x)$ (c) ✔ $\frac{f'(x)}{f(x)}$ (d) $f(x).f'(x)$

55. If $y = log\,10^{(ax^2+bx+c)}$ then $\frac{dy}{dx} =$

(a) ✔ $\frac{1}{(ax^2+bx+c)\ln 10}$ (b) $\frac{2ax+b}{(ax^2+bx+c)}$ (c) $10^{ax^2+bx+c}\,ln10$ (d) $\frac{2ax+b}{(ax^2+bx+c)lna}$

56. $ln\,a^e =$

(a) lna (b) ✔ $\frac{1}{lna}$ (c) $\frac{1}{\ln a^e}$ (d) $\ln e^e$

57. If $y = e^{2x}$, then $y_4 =$

(a) ✔ $16e^{2x}$ (b) $8e^{2x}$ (c) $4e^{2x}$ (d) $2e^{2x}$

58. If $f(x) = e^{2x}$, then $f'''(x) =$

(a) $6e^{2x}$ (b) $\frac{1}{6}e^{2x}$ (c) ✔ $8e^{2x}$ (d) $\frac{1}{8}e^{2x}$

59. If $f(x) = x^3 + 2x + 9$ then $f''(x) =$

(a) $3x^2 + 2$ (b) $3x^2$ (c) ✔ $6x$ (d) $2x$

60. If $y = x^7 + x^6 + x^5$ then $D^8(y) =$

(a) $7!$ (b) $7!\,x$ (c) $7! + 6!$ (d) ✔ 0

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61. $1-x+x^2-x^3+x^4+\cdots.+(-1)^n x^n+\cdots$ is the expansion of
(a) $\frac{1}{1-x}$ (b) ✔ $\frac{1}{1+x}$ (c) $\frac{1}{\sqrt{1-x}}$ (d) $\frac{1}{\sqrt{1+x}}$

62. $f(x)=f(0)+xf'(x)+\frac{x^2}{2!}f''(x)+\frac{x^3}{3!}f'''(x)+\cdots\ldots+\frac{x^n}{n!}f^n(x)\ldots$ is called____ series.
(a) ✔ Machlaurin's (b) Taylor's (c) Convergent (d) Divergent

63. $1-x+\frac{x^2}{2!}-\frac{x^3}{3!}+\frac{x^4}{4!}+$............. *is an expression of*
(a) e^x (b) $Sinx$ (c) ✔ $Cosx$ (d) e^{-x}

64. $a_0+a_1x+a_2x^2+\cdots+a_nx^n+\cdots$ *is*
(a) Maclaurin's series (b) Taylor Series (c) ✔ Power Series (d) Bionomial Serie

65. *A function* $f(x)$ *is such that, at a point* $x=c$, $f'(x)>0$ *at* $x=c$, *then* f *is said to be*
(a) ✔ Increasing (b) decreasing (c) constant (d) 1-1 function

66. *A function* $f(x)$ *is such that, at a point* $x=c$, $f'(x)<0$ *at* $x=c$, *then* f *is said to be*
(a) Increasing (b) ✔ decreasing (c) constant (d) 1-1 function

67. *A function* $f(x)$ *is such that, at a point* $x=c$, $f'(x)=0$ *at* $x=c$, *then* f *is said to be*
(a) Increasing (b) decreasing (c) ✔ constant (d) 1-1 function

68. A stationary point is called _____ if it is either a maximum point or a minimum point
(a) Stationary point (b) ✔ turning point (c) critical point (d) point of inflexion

69. If $f'(c)$ does not change before and after $x=c$, then this point is called______
(a) Stationary point (b) turning point (c) critical poin (d) ✔ point of inflexion

70. Let f be a differentiable function such that $f'(c)=0$ then if $f'(x)$ changes sign from -iv to +iv i.e., before and after $x=c$, then it occurs relative _____ at $x=c$
(a) Maximum (b) ✔ minimum (c) point of inflexion (d) none

71. Let f be a differentiable function such that $f'(c)=0$ then if $f'(x)$ does not change sign i.e., before and after $x=c$, then it occurs _____ at $x=c$
(b) Maximum (b) minimum (c) ✔ point of inflexion (d) none

72. Let f be differentiable function in neighborhood of c and $f'(c)=0$ then $f(x)$ has relative maxima at c if
(a) $f''(c)>0$ (b) ✔ $f''(c)<0$ (c) $f''(c)=0$ (d) $f''(c)\neq 0$

73. If $\int f(x)dx=\varphi(x)+c$,then $f(x)$ is called
(a) Integral (b) differential (c) derivative (d) ✔ integrand

74. Inverse of $\int\ldots.dx$ is:
(a) ✔ $\frac{d}{dx}$ (b) $\frac{dy}{dx}$ (c) $\frac{d}{dy}$ (d) $\frac{dx}{dy}$

75. Differentials are used to find:
(a) ✔ Approximate value (b) exact value (c) Both (a) and (b) (d) None of these

76. $xdy+ydx=$
(a) $d(x+y)$ (b) ✔ $d\left(\frac{x}{y}\right)$ (c) $d(x-y)$ (d) $d(xy)$

77. If $dy=cosxdx$ then $\frac{dx}{dy}=$
(a) $sinx$ (b) $cosx$ (c) $cscx$ (d) ✔ $secx$

78. If $\int f(x)dx=\varphi(x)+c$,then $f(x)$ is called
(b) Integral (b) differential (c) derivative (d) ✔ integrand

79. If $y=f(x)$, then differential of y is
(a) $dy=f'(x)$ (b) ✔ $dy=f'(x)dx$ (c) $dy=f(x)dx$ (d) $\frac{dy}{dx}$

80. The inverse process of derivative is called:
(a) Anti-derivative (b) ✔ Integration (c) Both (a) and (b) (d) None of these

81. If $n\neq 1$, then $\int(ax+b)^n dx=$
(a) $\frac{n(ax+b)^{n-1}}{a}+c$ (b) $\frac{n(ax+b)^{n+1}}{n}+c$ (c) $\frac{(ax+b)^{n-1}}{n+1}+c$ (d) ✔ $\frac{(ax+b)^{n+1}}{a(n+1)}+c$

82. $\int\sin(ax+b)\,dx=$
(a) ✔ $\frac{-1}{a}\cos(ax+b)+c$ (b) $\frac{1}{a}\cos(ax+b)+c$ (c) $a\cos(ax+b)+c$ (d) $-a\cos(ax+b)+c$

83. $\int e^{-\lambda x}dx=$

(a) $\lambda e^{-\lambda x}+c$ (b) $-\lambda e^{-\lambda x}+c$ (c) $\frac{e^{-\lambda x}}{\lambda}+c$ (d) ✔ $\frac{e^{-\lambda x}}{-\lambda}+c$

84. $\int a^{\lambda x}dx=$

(a) $\frac{a^{\lambda x}}{\lambda}$ (b) $\frac{a^{\lambda x}}{lna}$ (c) ✔ $\frac{a^{\lambda x}}{alna}$ (d) $a^{\lambda x}\lambda\, lna$

85. $\int[f(x)]^n f'(x)dx=$

(a) $\frac{f^n(x)}{n}+c$ (b) $f(x)+c$ (c) ✔ $\frac{f^{n+1}(x)}{n+1}+c$ (d) $nf^{n+1}(x)+c$

86. $\int\frac{f'(x)}{f(x)}dx=$

(a) $f(x)+c$ (b) $f'(x)+c$ (c) ✔ $\ln|x|+c$ (nd) $\ln|f'(x)|+c$

87. $\int\frac{dx}{\sqrt{x+a}+\sqrt{x}}$ can be evaluated if

(a) ✔ $x>0, a>0$ (b) $x<0, a>0$ (c) $x<0, a<0$ (d) $x>0, a<0$

88. $\int\frac{x}{\sqrt{x^2+3}}dx=$

(a) ✔ $\sqrt{x^2+3}+c$ (b) $-\sqrt{x^2+3}+c$ (c) $\frac{\sqrt{x^2+3}}{2}+c$ (d) $-\frac{1}{2}\sqrt{x^2+3}+c$

89. $\int\frac{dx}{x\sqrt{x^2-1}}=$

(a) ✔ $Sec^{-1}x+c$ (b) $Tan^{-1}x+c$ (c) $Cot^{-1}x+c$ (d) $Sin^{-1}x+c$

90. $\int\frac{dx}{xlnx}=$

(a) ✔ $\ln lnx+c$ (b) $x+c$ (c) $lnf'(x)+c$ (d) $f'(x)lnf(x)$

91. In $\int(x^2-a^2)^{\frac{1}{2}}dx$, the substitution is

(a) $x=atan\theta$ (b) ✔ $x=asec\theta$ (c) $x=asin\theta$ (d) $x=2asin\theta$

92. The suitable substitution for $\int\sqrt{2ax-x^2}dx$ is:

(a) $x-a=acos\theta$ (b) ✔ $x-a=asin\theta$ (c) $x+a=acos\theta$ (d) $x+a=asin\theta$

93. $\int\frac{x+2}{x+1}dx=$

(a) $\ln(x+1)+c$ (b) $\ln(x+1)-x+c$ (c) ✔ $x+\ln(x+1)+c$ (d) None

94. The suitable substitution for $\int\sqrt{a^2+x^2}dx$ is:

(b) ✔ $x=atan\theta$ (b) $x=asin\theta$ (c) $x=acos\theta$ (d)None of these

95. $\int udv$ equals:

(a) $udu-\int vu$ (b) $uv+\int vdu$ (c) ✔ $uv-\int vdu$ (d) $udu+\int vdu$

96. $\int xcosxdx=$

(a) $sinx+cosx+c$ (b) $cosx-sinx+c$ (c) ✔ $xsinx+cosx+c$ (d) None

97. $\int\frac{e^{Tan^{-1}x}}{1+x^2}dx=$

(a) $e^{Tanx}+c$ (b) $\frac{1}{2}e^{Tan^{-1}x}+c$ (c) $xe^{Tan^{-1}x}+c$ (d) ✔ $e^{Tan^{-1}x}+c$

98. $\int e^x\left[\frac{1}{x}+lnx\right]=$

(a) $e^x\frac{1}{x}+c$ (b) $-e^x\frac{1}{x}+c$ (c) ✔ $e^x lnx+c$ (d) $-e^x lnx+c$

99. $\int e^x\left[\frac{1}{x}-\frac{1}{x^2}\right]=$

(a) ✔ $e^x\frac{1}{x}+c$ (b) $-e^x\frac{1}{x}+c$ (c) $e^x lnx+c$ (d) $-e^x\frac{1}{x^2}+c$

100. $\int\frac{2a}{x^2-a^2}dx=$

(a) $\frac{x-a}{x+a}+c$ (b) ✔ $\ln\frac{x-a}{x+a}+c$ (c) $ln\frac{x+a}{x-a}+c$ (d) $\ln|x-a|+c$

101. $\int_{\pi}^{-\pi}sinxdx=$

(a) ✔ 2 (b) -2 (c) 0 (d) -1

102. $\int_{-1}^{2}|x|dx=$

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{5}{2}$ (d) ✔ $\frac{3}{2}$

103. $\int_0^1 (4x+k)dx = 2 \; then \; k =$

(a) 8 (b) -4 (c) ✔ 0 (d) -2

104. $\int_0^3 \frac{dx}{x^2+9} =$

(a) $\frac{\pi}{4}$ (b) ✔ $\frac{\pi}{12}$ (c) $\frac{\pi}{2}$ (d) None of these

105. $\int_0^{-\pi} sinx dx$ equals to:

(a) -2 (b) 0 (c) ✔ 2 (d) 1

106. $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} cost dt =$

(a) ✔ $\frac{\sqrt{3}}{2} - \frac{1}{2}$ (b) $\frac{\sqrt{3}}{2} + \frac{1}{2}$ (c) $\frac{1}{2} - \frac{\sqrt{3}}{2}$ (d) None

107. $\int_a^a f(x) =$

(a) ✔ 0 (b) $\int_b^a f(x)dx$ (c) $\int_b^a f(x)dx$ (d) $\int_a^a f(x)dx$

108. $\int_0^2 2x dx$ is equal to

(a) 9 (b) 7 (c) ✔ 4 (d) 0

109. To determine the area under the curve by the use of integration , the idea was given by

(a) Newton (b) ✔ Archimedes (c) Leibnitz (d) Taylor

110. The order of the differential equation : $x\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2 = 0$

(a) 0 (b) 1 (c) ✔ 2 (d) more than 2

1. The equation $y = x^2 - 2x + c$ represents (c being a parameter)

111. One parabola (b) ✓ family of parabolas (c) family of line (d) two parabolas

112. Solution of the differential equation : $\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$

(a) ✔ $y = \sin^{-1} x + c$ (b) $y = \cos^{-1} x + c$ (c) $y = \tan^{-1} x + c$ (d) None

113. The general solution of differential equation $\frac{dy}{dx} = -\frac{y}{x}$ is

(a) $\frac{x}{y} = c$ (b) $\frac{y}{x} = c$ (c) ✔ $xy = c$ (d) $x^2y^2 = c$

114. Solution of differential equation $\frac{dv}{dt} = 2t - 7$ is :

(a) $v = t^2 - 7t^3 + c$ (b) $v = t^2 + 7t + c$ (c) $v = t - \frac{7t^2}{2} + c$ (d) ✔ $v = t^2 - 7t + c$

115. The solution of differential equation $\frac{dy}{dx} = sec^2 x$ is

(a) $y = cosx + c$ (b) ✔ $y = tanx + c$ (c) $y = sinx + c$ (d) $y = cotx + c$

116. $If \; x < 0, y < 0$ then the point $P(x, y)$ lies in the quadrant

(a) I (b) II (c) ✔ III (d) IV

117. The point P in the plane that corresponds to the ordered pair (x, y) is called:

(a) ✔ $graph \; of \; (x, y)$ (b) mid-point of x, y (c) $abscissa \; of \; x, y$ (d) ordinate of x, y

118. The straight line which passes through one vertex and perpendicular to opposite side is called:

(a) Median (b) ✔ altitude (c) perpendicular bisector (d) normal

119. The point where the medians of a triangle intersect is called_______ of the triangle.

(a) ✔ Centroid (b) centre (c) orthocenter (d) circumference

120. The point where the altitudes of a triangle intersect is called_______ of the triangle.

(a) Centroid (b) centre (c) ✔ orthocenter (d) circumference

121. The centroid of a triangle divides each median in the ration of

(a) ✔ 2:1 (b) 1:2 (c) 1:1 (d) None of these

122. The point where the angle bisectors of a triangle intersect is called_______ of the triangle.

(a) Centroid (b) ✔ in centre (c) orthocenter (d) circumference

123. The two intercepts form of the equation of the straight line is

(a) $y = mx + c$ (b) $y - y_1 = m(x - x_1)$ (c) ✔ $\frac{x}{a} + \frac{y}{b} = 1$ (d) $xcos\alpha + ycos\alpha = p$

124. The Normal form of the equation of the straight line is

(a) $y = mx + c$ (b) $y - y_1 = m(x - x_1)$ (c) $\frac{x}{a} + \frac{y}{b} = 1$ (d) ✔ $xcos\alpha + ycos\alpha = p$

125. In the normal form $xcos\alpha + ycos\alpha = p$ the value of p is
(a) ✔Positive (b) Negative (c) positive or negative (d) Zero

126. If α is the inclination of the line l then $\frac{x-x_1}{cos\alpha} = \frac{y-y_1}{sin\alpha} = r(say)$
(a) Point-slope form (b) normal form (c) ✔symmetric form (d) none of these

127. The slope of the line $ax + by + c = 0$ is
(a) $\frac{a}{b}$ (b) ✔ $-\frac{a}{b}$ (c) $\frac{b}{a}$ (d) $-\frac{b}{a}$

128. The slope of the line perpendicular to $ax + by + c = 0$
(a) $\frac{a}{b}$ (b) $-\frac{a}{b}$ (c) ✔ $\frac{b}{a}$ (d) $-\frac{b}{a}$

129. The general equation of the straight line in two variables x and y is
(a) ✔$ax + by + c = 0$ (b) $ax^2 + by + c = 0$ (c) $ax + by^2 + c = 0$ (d) $ax^2 + by^2 + c = 0$

130. The x - $intercept$ $4x + 6y = 12$ is
(a) 4 (b) 6 (c) ✔ 3 (d) 2

131. The lines $2x + y + 2 = 0$ and $6x + 3y - 8 = 0$ are
(a) ✔Parallel (b) perpendicular (c) neither (d) non coplanar

132. If φ be an angle between two lines l_1 and l_2 when slopes m_1 and m_2, then angle from l_1 to l_2
(a) $tan\varphi = \frac{m_1 - m_2}{1+m_1 m_2}$ (b) ✔ $tan\varphi = \frac{m_2 - m_1}{1+m_2 m_1}$ (c) $tan\varphi = \frac{m_1 + m_2}{1+m_1 m_2}$ (d) $tan\varphi = \frac{m_2 + m_1}{1+m_1 m_2}$

133. If φ be an acute angle between two lines l_1 and l_2 when slopes m_1 and m_2, then acute angle from l_1 to l_2
(a) $|tan\varphi = \frac{m_1 - m_2}{1+m_1 m_2}|$ (b) ✔$|tan\varphi = \frac{m_2 - m_1}{1+m_2 m_1}|$ (c) $|tan\varphi = \frac{m_1 + m_2}{1+m_1 m_2}|$ (d)$|tan\varphi = \frac{m_2 + m_1}{1+m_1 m_2}|$

134. Two lines l_1 and l_2 with slopes m_1 and m_2 are parallel if
(a) ✔$m_1 - m_2 = 0$ (b) $m_1 + m_2 = 0$ (c) $m_1 m_2 = 0$ (d) $m_1 m_2 = -1$

135. Two lines l_1 and l_2 with slopes m_1 and m_2 are perpendicular if
(b) $m_1 - m_2 = 0$ (b) $m_1 + m_2 = 0$ (c) $m_1 m_2 = 0$ (d) ✔ $m_1 m_2 = -1$

136. The lines represented by $ax^2 + 2hxy + by^2 = 0$ are orthogonal if
(a) $a - b = 0$ (b) ✔ $a + b = 0$ (c) $a + b > 0$ (d) $a - b < 0$

137. The lines lying in the same plane are called
(a) Collinear (b) ✔ coplanar (c) non-collinear (d) non-coplanar

138. The distance of the point $(3, 7)$ from the $x - axis$ is
(a) ✔7 (b) -7 (c) 3 (d) -3

139. Two lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are parallel if
(a) ✔$\frac{a_1}{a_2} = \frac{b_1}{b_2}$ (b) $\frac{a_1}{b_1} = -\frac{a_2}{b_2}$ (c) $\frac{a_1}{c_1} = \frac{a_2}{c_2}$ (d) $\frac{b_1}{c_1} = \frac{b_2}{c_2}$

140. The equation $y^2 - 16 = 0$ represents two lines.
(a) ✔Parallel to $x - axis$ (b) Parallel $y - axis$ (c) not || to $x - axis$ (d) not || to $y - axis$

141. The perpendicular distance of the line $3x + 4y + 10 = 0$ from the origin is
(a) 0 (b) 1 (c) ✔2 (d) 3

142. The lines represented by $ax^2 + 2hxy + by^2 = 0$ are orthogonal if
(b) $a - b = 0$ (b) ✔ $a + b = 0$ (c) $a + b > 0$ (d) $a - b < 0$

143. Every homogeneous equation of second degree $ax^2 + bxy + by^2 = 0$ represents two straight lines
(a) ✔ through the origin (b) not through the origin (c) two || line (d) two ⊥ar lines

144. The equation $10x^2 - 23xy - 5y^2 = 0$ is homogeneous of degree
(a) 1 (b) ✔ 2 (c) 3 (d) more than 2

145. The equation $y^2 - 16 = 0$ represents two lines.
(a) ✔Parallel to $x - axis$ (b) Parallel $y - axis$ (c) not || to $x - axis$ (d) not || to $y - axis$

146. (0,0) is satisfied by
(a) $x - y < 10$ (b) $2x + 5y > 10$ (c) ✔ $x - y \geq 13$ (d) None

147. The point where two boundary lines of a shaded region intersect is called ____ point.
(a) Boundary (b) ✔ corner (c) stationary (d) feasible

148. If $x > b$ then

(a) $-x > -b$ (b) $-x < b$ (c) $x < b$ (d) ✔ $-x < -b$

149. The symbols used for inequality are

(a) 1 (b) 2 (c) 3 (d) ✔4

150. An inequality with one or two variables has ______ solutions.

(a) One (b) two (c) three (d) ✔ infinitely many

151. $ax + by < c$ is not a linear inequality if

(a) ✔ $a = 0, b = 0$ (b) $a \neq 0, b \neq 0$ (c) $a = 0, b \neq 0$ (d) $a \neq 0, b = 0, c = 0$

152. The graph of corresponding linear equation of the linear inequality is a line called______

(a) ✔ Boundary line (b) horizontal line (c) vertical line (d) inclined line

1. The graph of a linear equation of the form $ax + by = c$ is a line which divides the whole plane into _____ disjoint parts.

(a) ✔ Two (b) four (c) more than four (d) infinitely many

153. The graph of the inequality $x \leq b$ is

(a) Upper half plane (b) lower half plane (c) ✔ left half plane (d) right half plane

154. The graph of the inequality $y \leq b$ is

(b) Upper half plane (b) ✔ lower half plane (c) left half plane (d) right half plane

155. The feasible solution which maximizes or minimizes the objective function is called

(a) Exact solution (b) ✔ optimal solution (c) final solution (d) objective function

156. Solution space consisting of all feasible solutions of system of linear in inequalities is called

(a) Feasible solution (b) Optimal solution (c) ✔ Feasible region (d) General solution

157. Corner point is also called

(a) Origin (b) Focus (c) ✔ Vertex (d) Test point

158. For feasible region:

(a) ✔ $x \geq 0, y \geq 0$ (b) $x \geq 0, y \leq 0$ (c) $x \leq 0, y \geq 0$ (d) $x \leq 0, y \leq 0$

159. $x = 0$ is in the solution of the inequality

(a) $x < 0$ (b) $x + 4 < 0$ (c) ✔ $2x + 3 > 0$ (d) $2x + 3 < 0$

160. Linear inequality $2x - 7y > 3$ is satisfied by the point

(a) (5,1) (b) (-5,-1) (c) (0,0) (d) ✔ (1,-1)

161. The non-negative constraints are also called

(a) ✔ Decision variable (b) Convex variable (c) Decision constraints (d) concave variable

1. If the line segment obtained by joining any two points of a region lies entirely within the region , then the region is called

(a) Feasible region (b) ✔ Convex region (c) Solution region (d) Concave region

162. A function which is to be maximized or minimized is called:

(a) Linear function (b) ✔ Objective function (c) Feasible function (d) None of these

163. For optimal solution we evaluate the objective function at

(a) Origen (b) Vertex (c) ✔ Corner Points (d) Convex points

164. We find corner points at

(a) Origen (b) Vertex (c) ✔ Feasible region (d) Convex region

165. The set of points which are equal distance from a fixed point is called:

(a) ✔ Circle (b) Parabola (c) Ellipse (d) Hyperbola

166. The circle whose radius is zero is called:

(a) Unit circle (b) ✔ point circle (c) circumcircle (d) in-circle

167. The circle whose radius is 1 is called:

(a) ✔ Unit circle (b) point circle (c) circumcircle (d) in-circle

168. The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents the circle with centre

(a) (g, f) (b) ✔ $(-g, -f)$ (c) $(-f, -g)$ (d) $(g, -f)$

169. The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents the circle with centre

(a) ✔ $\sqrt{g^2 + f^2 - c}$ (b) $\sqrt{g^2 + f^2 + c}$ (c) $\sqrt{g^2 + c^2 - f}$ (d) $\sqrt{g + f - c}$

170. The ratio of the distance of a point from the focus to distance from the directrix is denoted by

(a) ✔r (b) R (c) E (d) e

171. Standard equation of Parabola is :

(a) $y^2 = 4a$ (b) $x^2 + y^2 = a^2$ (c) ✔ $y^2 = 4ax$ (d) $S = vt$

172. The focal chord is a chord which is passing through

(a) ✔Vertex (b) Focus (c) Origin (d) None of these

173. The curve $y^2 = 4ax$ is symmetric about

(a) ✔$y - axis$ (b) $x - axis$ (c) Both (a) and (b) (d) None of these

174. Latusrectum of $x^2 = -4ay$ is

(a) $x = a$ (b) $x = -a$ (c) $y = a$ (d) ✔ $y = -a$

175. Eccentricity of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

(a) $\frac{a}{c}$ (b) ac (c) ✔ $\frac{c}{a}$ (d) None of these

176. Focus of $y^2 = -4ax$ is

(a) $(0, a)$ (b) ✔$(-a, 0)$ (c) $(a, 0)$ (d) $(0, -a)$

177. A type of the conic that has eccentricity greater than 1 is

(a) An ellipse (b) A parabola (c) ✔ A hyperbola (d) A circle

178. $x^2 + y^2 = -5$ represents the

(a) Real circle (b) ✔Imaginary circle (c) Point circle (d) None of these

179. Which one is related to circle

(a) $e = 1$ (b) $e > 1$ (c) $e < 1$ (d) ✔$e = 0$

180. Circle is the special case of :

(a) Parabola (b) Hyperbola (c) ✔Ellipse (d) None of these

181. Equation of the directrix of $x^2 = -4ay$ is:

(a) $x + a = 0$ (b) $x - a = 0$ (c) $y + a = 0$ (d) ✔ $y - a = 0$

182. The midpoint of the foci of the ellipse is its

(a) Vertex (b) ✔ Centre (c) Directrix (d) None of these

183. Focus of the ellipse always lies on the

(a) Minor axis (b) ✔Major axi (c) Directrix (d) None of these

184. Length of the major axis of $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $a > b$ is

(a) ✔$2a$ (b) $2b$ (c) $\frac{2b^2}{a}$ (d) None of these

185. In the cases of ellipse it is always true that:

(a) ✔$a^2 > b^2$ (b) $a^2 < b^2$ (c) $a^2 = b^2$ (d) $a < 0, b < 0$

186. Two conics always intersect each other in _____ points

(a) No (b) one (c) two (d) ✔ four

187. The eccentricity of ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ is

(a) ✔ $\frac{\sqrt{7}}{4}$ (b) $\frac{7}{4}$ (c) 16 (d) 9

188. The foci of an ellipse are $(4, 1)$ and $(0, 1)$ then its centre is:

(a) (4,2) (b) ✔(2,1) (c) (2,0) (d) (1,2

189. The foci of hyperbola always lie on :

(a) $x - axis$ (b) ✔ *Transverse axis* (c) $y - axis$ (d) Conjugate axis

190. Length of transverse axis of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

(a) ✔$2a$ (b) $2b$ (c) a (d) b

191. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is symmetric about the:

(a) $y - axis$ (b) $x - axis$ (c) ✔Both (a) and (b) (d) None of these

1. Two vectors are said to be negative of each other if they have the same magnitude and ___________direction.

(a) Same (b) ✔ opposite (c) negative (d) parallel

192. Parallelogram law of vector addition to describe the combined action of two forces, was used by

(a) Cauchy (b) ✔ Aristotle (c) Alkhwarzmi (d) Leibnitz

193. **The vector whose initial point is at the origin and terminal point is P , is called**

(a) Null vector (b) unit vector (c) ✔position vector (d) normal vector

194. **If R be the set of real numbers, then the Cartesian plane is defined as**

(a) $R^2 = \{(x^2, y^2): x, y \in R\}$ (b) ✔ $R^2 = \{(x, y): x, y \in R\}$ (c) $R^2 = \{(x, y): x, y \in R, x = -y\}$ (d) $R^2 = \{(x, y): x, y \in R, x = y\}$

195. **The element $(x, y) \in R^2$ represents a**

(a) Space (b) ✔ point (c) vector (d) line

196. **If $\underline{u} = [x, y]$ in R^2, then $|\underline{u}| =$?**

(a) $x^2 + y^2$ (b) ✔ $\sqrt{x^2 + y^2}$ (c) $\pm\sqrt{x^2 + y^2}$ (d) $x^2 - y^2$

197. **If $|\underline{u}| = \sqrt{x^2 + y^2} = 0$, then it must be true that**

(a) $x \geq 0, y \geq 0$ (b) $x \leq 0, y \leq 0$ (c) $x \geq 0, y \leq 0$ (d) ✔ $x = 0, y = 0$

198. **Each vector $[x, y]$in R^2 can be uniquely represented as**

(a) $x\underline{i} - y\underline{j}$ (b) ✔ $x\underline{i} + y\underline{j}$ (c) $x + y$ (d) $\sqrt{x^2 + y^2}$

199. **The lines joining the mid-points of any two sides of a triangle is always ____to the third side.**

(a) Equal (b) ✔ Parallel (c) perpendicular (d) base

200. **If $\underline{u} = 3\underline{i} - \underline{j} + 2\underline{k}$ then [3,-1,2] are called __________ of $\underline{u}$.**

(a) Direction cosines (b) ✔ direction ratios (c) direction angles (d) elements

201. **Which of the following can be the direction angles of some vector**

(a) $45°, 45°, 60°$ (b) $30°, 45°, 60°$ (c) ✔$45°, 60°, 60°$ (d) obtuse

202. **Measure of angle θ between two vectors is always.**

(a) $0 < \theta < \pi$ (b) $0 \leq \theta \leq \frac{\pi}{2}$ (c) ✔$0 \leq \theta \leq \pi$ (d) obtuse

203. **If the dot product of two vectors is zero, then the vectors must be**

(a) Parallel (b) ✔ orthogonal (c) reciprocal (d) equal

204. **If the cross product of two vectors is zero, then the vectors must be**

(a) ✔ Parallel (b) orthogonal (c) reciprocal (d) Non coplanar

205. **If θ be the angle between two vectors $\underline{a}$ and $\underline{b}$, then $cos\theta =$**

(a) $\frac{\underline{a} \times \underline{b}}{|\underline{a}||\underline{b}|}$ (b) ✔ $\frac{\underline{a}.\underline{b}}{|\underline{a}||\underline{b}|}$ (c) $\frac{\underline{a}.\underline{b}}{|\underline{a}|}$ (d) $\frac{\underline{a}.\underline{b}}{|\underline{b}|}$

206. **If θ be the angle between two vectors $\underline{a}$ and $\underline{b}$, then projection of $\underline{b}$ along $\underline{a}$ is**

(a) $\frac{\underline{a} \times \underline{b}}{|\underline{a}||\underline{b}|}$ (b) $\frac{\underline{a}.\underline{b}}{|\underline{a}||\underline{b}|}$ (c) ✔ $\frac{\underline{a}.\underline{b}}{|\underline{a}|}$ (d) $\frac{\underline{a}.\underline{b}}{|\underline{b}|}$

207. **If θ be the angle between two vectors $\underline{a}$ and $\underline{b}$, then projection of $\underline{a}$ along $\underline{b}$ is**

(a) $\frac{\underline{a} \times \underline{b}}{|\underline{a}||\underline{b}|}$ (b) $\frac{\underline{a}.\underline{b}}{|\underline{a}||\underline{b}|}$ (c) $\frac{\underline{a}.\underline{b}}{|\underline{a}|}$ (d) ✔ $\frac{\underline{a}.\underline{b}}{|\underline{b}|}$

208. **Let $\underline{u} = a\underline{i} + b\underline{j} + c\underline{k}$ then projection of $\underline{u}$ along $\underline{i}$ is**

(a) ✔a (b) b (c) c (d) u

209. **In any ΔABC , the law of cosine is**

(a) ✔$a^2 = b^2 + c^2 - 2bcCosA$ (b) $a = bCosC + cCosB$ (c) $a.b = 0$ (d) $a - b = 0$

210. **In any ΔABC , the law of projection is**

(a) $a^2 = b^2 + c^2 - 2bcCosA$ (b) ✔ $a = bCosC + cCosB$ (c) $a.b = 0$ (d) $a - b = 0$

211. **If $\underline{u}$ is a vector such that $\underline{u}.\underline{i} = 0, \underline{u}.\underline{j} = 0, \underline{u}.\underline{k} = 0$ then $\underline{u}$ is called**

(a) Unit vector (b) ✔ null vector (c) $[\underline{i}, \underline{j}, \underline{k}]$ (d) none of these

212. **Cross product or vector product is defined**

(a) In plane only (b) ✔in space only (c) everywhere (d) in vector field

213. **If $\underline{u}$ and $\underline{v}$ are two vectors , then $\underline{u} \times \underline{v}$ is a vector**

(a) Parallel to $\underline{u}$and $\underline{v}$ (b) parallel to $\underline{u}$ (c) ✔ perpendicular to $\underline{u}$ and $\underline{v}$ (d) orthogonal to $\underline{u}$

214. **If $\underline{u}$ and $\underline{v}$ be any two vectors, along the adjacent sides of ||gram then the area of ||gram is**

(a) $\underline{u} \times \underline{v}$ (b) ✔ $|\underline{u} \times \underline{v}|$ (c) $\frac{1}{2}(\underline{u} \times \underline{v})$ (d) $\frac{1}{2}|\underline{u} \times \underline{v}|$

215. **If $\underline{u}$ and $\underline{v}$ be any two vectors, along the adjacent sides of triangle then the area of triangle is**

(a) $\underline{u} \times \underline{v}$ (b) $|\underline{u} \times \underline{v}|$ (c) $\frac{1}{2}(\underline{u} \times \underline{v})$ (d) ✔ $\frac{1}{2}|\underline{u} \times \underline{v}|$

216. **The scalar triple product of $\underline{a}$, $\underline{b}$ and $\underline{c}$ is denoted by**

(a) $\underline{a}.\underline{b}.\underline{c}$ (b) ✔ $\underline{a}.\underline{b} \times \underline{c}$ (c) $\underline{a} \times \underline{b} \times \underline{c}$ (d) $(\underline{a} + \underline{b}) \times \underline{c}$

217. **Cross product or vector product is defined**

(b) In plane only (b) ✔ in space only (c) everywhere (d) in vector field

218. **If $\underline{u}$ and $\underline{v}$ are two vectors , then $\underline{u} \times \underline{v}$ is a vector**

(b) Parallel to $\underline{u}$ and $\underline{v}$ (b) parallel to $\underline{u}$ (c) ✔ perpendicular to $\underline{u}$ and $\underline{v}$ (d) orthogonal to $\underline{u}$

219. **If $\underline{u}$ and $\underline{v}$ be any two vectors, along the adjacent sides of ||gram then the area of ||gram is**

(b) $\underline{u} \times \underline{v}$ (b) ✔ $|\underline{u} \times \underline{v}|$ (c) $\frac{1}{2}(\underline{u} \times \underline{v})$ (d) $\frac{1}{2}|\underline{u} \times \underline{v}|$

220. **If $\underline{u}$ and $\underline{v}$ be any two vectors, along the adjacent sides of triangle then the area of triangle is**

(b) $\underline{u} \times \underline{v}$ (b) $|\underline{u} \times \underline{v}|$ (c) $\frac{1}{2}(\underline{u} \times \underline{v})$ (d) ✔ $\frac{1}{2}|\underline{u} \times \underline{v}|$

221. **Two non zero vectors are perpendicular iff**

(a) $\underline{u}.\underline{v} = 1$ (b) $\underline{u}.\underline{v} \neq 1$ (c) $\underline{u}.\underline{v} \neq 0$ (d) ✔ $\underline{u}.\underline{v} = 0$

222. **The scalar triple product of $\underline{a}$, $\underline{b}$ and $\underline{c}$ is denoted by**

(b) $\underline{a}.\underline{b}.\underline{c}$ (b) ✔ $\underline{a}.\underline{b} \times \underline{c}$ (c) $\underline{a} \times \underline{b} \times \underline{c}$ (d) $(\underline{a} + \underline{b}) \times \underline{c}$

223. **The vector triple product of $\underline{a}$, $\underline{b}$ and $\underline{c}$ is denoted by**

(a) $\underline{a}.\underline{b}.\underline{c}$ (b) $\underline{a}.\underline{b} \times \underline{c}$ (c) ✔ $\underline{a} \times \underline{b} \times \underline{c}$ (d) $(\underline{a} + \underline{b}) \times \underline{c}$

224. **Notation for scalar triple product of $\underline{a}$, $\underline{b}$ and $\underline{c}$ is**

(a) $\underline{a}.\underline{b} \times \underline{c}$ (b) $\underline{a} \times \underline{b}.\underline{c}$ (c) $[\underline{a}.\underline{b}.\underline{c}]$ (d) ✔ all of these

225. **If the scalar product of three vectors is zero, then vectors are**

(a) Collinear (b) ✔ coplanar (c) non coplanar (d) non-collinear

226. **If any two vectors of scalar triple product are equal, then its value is equal to**

(a) 1 (b) ✔0 (c) -1 (d) 2

227. **Moment of a force $\underline{F}$ about a point is given by:**

(a) Dot product (b) ✔cross product (c) both (a) and (b) (d) None of these

Q.NO.2

1. $x = at^2, y = 2at$ **represent the equation of parabola** $y^2 = 4ax$
2. **Express the perimeter P of square as a function of its area A.**
3. **Show that** $x = acos\theta , y = bsin\theta$ **represent the equation of ellipse** $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
4. **Show that:** $\sinh 2x = 2\sinh x \cosh x$
   Express the volume V of a cube as a function of the area A of its base.
5. **Find** $\frac{f(a+h)-f(a)}{h}$ **and simplify** $f(x) = cos x$
6. $f(x) = \frac{1}{\sqrt{x-1}}, x \neq 1 ;\ g(x) = (x^2 + 1)^2$
7. **(a)** $f^{-1}(x)$ **(b)** $f^{-1}(-1)$ **and verify** $f(f^{-1}(x)) = f^{-1}f(x)) = xf(x) = \frac{2x+1}{x-1}, x > 1$
8. **Show that** $\lim_{x\to 0} \frac{a^x - 1}{x} = \log_e a$
9. **Evaluate** $\lim_{x\to 0} \frac{Sin7x}{x}$
10. **Evaluate** $\lim_{n\to +\infty} \left(1 + \frac{1}{n}\right)^{\frac{n}{2}}$
11. $\text{Lim}_{h\to 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$
12. $\text{Lim}_{x\to 0} (1 + 2x^2)^{\frac{1}{x^2}}$
13. **Evaluate** $\lim_{\theta\to 0} \frac{1 - cos\theta}{\theta}$
14. **Evaluate** $\lim_{x\to 0} \frac{x^n - a^n}{x^m - a^m}$