1. If $xy^3 - yx^3 = 6$ is the equation of a curve, find the slope at point (1,2)

*A. -2/11

B. 2/11

C. 6

D. 2

E. 11

2. If $xy^3 - yx^3 = 6$ is the equation of a curve, find the equation of the tangent at point (1, 2)

*A. $2x + 11y - 24 = 0$

B. $2x - 11y + 24 = 0$

C. $11y - 24 = 0$

D. $2x - 24 = 0$

E. $2x + 1$

3. If $x^3 + y^3 = 3ax^2$, obtain the derivative $\frac{dy}{dx}$

*A. $(2ax - x^2)/y^2$

B. $2ax + x^2/y^2$

C. $2ax - x^2/y^2$

D. $2ax + x^2/y^2$

E. $2ax - x^2$

4. if $ye^{xy} = \sin x$ find $\frac{d^2y}{dx^2}$ at (0,0)

A. 2

*B. 0

C. 1

D. cosx

E. sinx

5. if $z^3 + xy - y^2z = 6$. Obtain the value of $\frac{\partial y}{\partial x}$ at (0,1,2)

A. 1

*B. ¼

C. -1/11

D. 6

E. 2

6. if $z^3 + xy - y^2z = 6$. Obtain the value of $\frac{\partial^2 y}{\partial x^2}$ at (0,1,2)

A. ¼

*B. -1/11

C. 6

D. 1

E. 2

7. State the degree of homogeneous function $\left(\sqrt{(x^2 + y)^2}\right)^3$

A. 0

B. 1

*C. 3

D. 2

E. 2/3

8. Obtain the degree of the homogeneous function $x^{1/3}y^{-4/3}\tan^{-1}(y/x)$

A. 0

B. 1

*C. -1

D. 2

E. 2/3

9. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of (x -1) and (y -1), state the value of f_x

A. 1

B. $x + 2y$

*C. $2x + y$

D. 0

E. 2

10. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of (x -1) and (y -1), state the value

of f_y

A. 1

B. -1

C. 2x +y

*D. x +2y

E. 2

11. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of (x -1) and (y -1), state the value of f_{xy}

A. x +2y

B. -1

C. 2x +y

*D. 1

E. 2

12. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of (x -1) and (y -1), state the value of f_{xx}

A. x +2y

B. -1

C. 2x +y

*D. 2

E. 0

13. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of (x -1) and (y -1), state the value of f_{yy}

A. x +2y

B. -1

C. 2x +y

*D. 2

E. 0

14. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of (x -1) and (y -1), state the value of f_{xxx}

A. x +2y

B. -1

C. $2x + y$

D. 2

*E. 0

15. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of $(x - 1)$ and $(y - 1)$, state the value of f_{xxy}

A. $x + 2y$

B. -1

C. $2x + y$

D. 2

*E. 0

16. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of $(x - 1)$ and $(y - 1)$, state the value of f_{yyx}

A. $x + 2y$

B. -1

C. $2x + y$

D. 2

*E. 0

17. In the Taylor's expansion of $f(x,y) = x^2 + xy + y^2$ in powers of $(x - 1)$ and $(y - 1)$, state the value of f_{yyy}

*A. 0

B. -1

C. $2x + y$

D. 2

E. 0

18. State the coefficient of f_{yy} in the Maclaurin expansion of $f(x,y) = e^{x + y}$

*A. ½

B. 0

C. 2

D. 1

E. $x+y$

19. State the coefficient of f_{xy} in the Maclaurin expansion of $f(x,y) = e^{x + y}$

A. ½

B. 0

C. 2

*D. 1

E. x+y

20. State the stationary values for the function $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$

*A. (6, 0), (4, 0), (5, 1), (5, -1)

B. (-6, 0), (4, 0), (5, 1), (5, -1)

C. (6, 0), (4, 0), (5, 1), (-5, 1)

D. (6, 0), (4, 0), (1, 5), (5, -1)

E. (6, 0), (-4, 0), (5, 1), (5, -1)

21. Which of the stationary values of the function $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ gives the maximum?

*A. (4, 0)

B. (6, 0)

C. (5, 1)

D. (5, -1)

E. (0, 0)

22. Which of the stationary values of the function $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ gives the minimum?

A. (4, 0)

*B. (6, 0)

C. (5, 1)

D. (5, -1)

E. (0, 0)

23. Which of the stationary values of the function $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ gives the saddle?

A. (6, 0), (4, 0)

B. (-6, 0), (4, 0)

*C. (5, 1), (5, -1)

D. (-6, 0), (4, 0)

E. (6, 0), (-4, 0)

24. Obtain the value of the function $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ at the maximum point.

A. 6

B. -36

C. 108

*D. 112

E. None of the above

25. Obtain the value of the function $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ at the minimum point.

A. 6

B. -36

*C. 108

D. 112

E. None of the above

26. Evaluate $\int_0^{\frac{\pi}{2}} \sin^7 x dx$

A. 6/7

B. 4/5

C. 2/3

D. 3/8

*E. 16/35

27. Determine the area enclosed by the curve $a^2x^2 = y^3(2a - y)$

*A. πa^2

B. x^3

C. y^3

D. πa^3

E. $\pi y^3(2a - y)$

28. Determine the volume of solid generated by revolving the plane area bounded by $y^2 = 4x$ and $x=4$ about the line $x = 4$.

*A. $1024\pi/15$

B. $1024/15$

C. 1024

D. 15

E. π

29. What is the volume generated by revolving the area enclosed by the loop of the curve $y^4 = x(4 - x)$ about the x axis.

*A. $2\pi^2$

B. π^2

C. $-\pi^2$

D. $4\pi^2$

E. $-2\pi^2$

30. find the area of the surface generated by revolving the curve with parametric equations $x(t) = 3t(t - 2), y(t) = 8t^{\frac{3}{2}}$

*A. 39π

B. -39π

C. 8π

D. 3π

E. $39/2\pi$

31. Evaluate $\iint_D (x^2 + y^2)dxdy$, where D is bounded by $y = x, y^2 = 4x$

A. 384/35

B. 768/35

C. -384/35

*D. 768/35

E. None of the above

32. Solve $\int\left[\frac{3}{2x - 5} + \frac{2}{x - 8}\right]dx$

*A. $\frac{3}{2}\ln(2x - 5) + 2\ln(x - 8) + C$

B. $\frac{3}{2}\ln(2x + 5) + 2\ln(x - 8) + C.$

C. $\ln(2x - 5) + \ln(x - 8) + C$

D. $\frac{3}{2}\ln(2x - 5) + 2\ln(x + 8) + C$

E. $\frac{3}{2}\ln(2x - 5) + C$

33. Express $\frac{5x - 21}{(x - 3)^2}$ in Partial Fraction

A. $(5x - 21)/(x - 3)$

*B. $5/(x - 3) - 6/(x - 3)^2$

C. $-6/(x - 3)^2$

D. $5/(x - 3)$

E. 0

34. Which of the following is continuous at the specified point:

A. $f(x) = \frac{\sin x}{x}$, at $x = 0$

B. $f(x) = \frac{x^2 - 1}{x - 1}$, at $x = 1$

C. $f(x) = \frac{1}{x}$, at $x = 0$

D. $f(x) = \frac{x^2 - 9}{x - 3}$, at $x = 3$

*E. $f(x) = \frac{3x}{x + 5}$, at $x = 0$

35. Let $f: I \rightarrow R$ where $I \rightarrow R$. Let $g: I \rightarrow R$ be real valued functions which are differentiable at $p \epsilon I$ and let $\lambda \epsilon R$. then which of the following statement is likely not to be true

A. $f + g$ is a differentiable at $x = p$

B. λf is a differentiable at $x = p$

C. fg is a differentiable at $x = p$

*D. f/g is a differentiable at $x = p$ provided $g(p) \neq 0$

E. f, g is a continuous at $x = p$

36. Evaluate $I = \int_C (x - y^2)dx$, if C is the line segment of the straight line $y = x, 0 \leq x \leq 1$

*A. 1/6

B. 1

C. 0

D. x=y

E. 2/3

37. Evaluate the double integral I $=\iint_R(x^2+y)dxdy$ where R is the region bounded by line $y=x^2$ and the curve.

*A. 1/6

B. 1/3

C. 2/3

D. 0

E. -1

38. if $a=e$, the nth derivative of $y=a^{mx}$ is

A. $ma^{mx}\log_e a$

B. $m^2a^{mx}(\log_e a)^2$

*C. m^ne^{mx}

D. ma^{mx}

E. $a^{mx}(\log_e a)^2$

39. Obtain the derivative of $y=e^{ax}\cos(bx+c)$

*A. $e^{ax}[a\cos(bx+c)-b\sin(bx+c)]$

B. $e^{ax}\cos(bx+c)$

C. $a\cos(bx+c)$

D. $-b\sin(bx+c)$

E. $-a\cos(bx+c)$

40. Obtain the derivative of $x^3\ln x$

A. $3x^2\ln x$

*B. $3x^2\ln x+x^2$

C. $x^2\ln x$

D. $3\ln x$

E. $3x^2\ln x-x^2$

41. obtain $\frac{d^2y}{dx^2}$ if $x^3+y^3=3axy$

A. $2a^3xy/(y^2-ax)^3$

*B. $-2a^3xy/(y^2 - ax)^3$

C. $(y^2 - ax)^3$

D. $-2a^3x/(y^2 - ax)^3$

E. $-2xy/(y^2 - ax)^3$

42. If $y = \tan^{-1}\frac{2x}{1 - x^2}$ obtain $\frac{dy}{dx}$

*A. $2/(1 + x^2)$

B. $2/(x + x^2)$

C. $-2/(1 + x^2)$

D. $2/(1 - x^2)$

E. $x/(1 + x^2)$

43. Given that $y = \left(\frac{1}{x}\right)^x$, find $\frac{d^2y}{dx^2}$

A. x

B. −x

*C. 0

D. -1

E. 1

44. Obtain the first derivative of $y = x\sin x$

A. $x\sin x$

B. $\sin x$

C. $x\sin x - \cos x$

*D. $x\cos x + \sin x$

E. $\cos x$

45. If $= ax^5 + bx^4 + cx^3 + dx^2 + ex + f$, then $\frac{d^6y}{dx^6}$ is ………………

A. a

B. b

C. e

D. 3

*E. 0

46. Given that $y = x^2 \sin x$, obtain $\frac{dy}{dx}$

A. $x^2\cos x$

B. $\cos x$

C. $\sin x$

*D. $x^2\cos x + 2x\sin x$

E. $x^2\cos x - 2x\sin x$

47. Obtain the derivative of $y = x^{n-1}\ln x$ at $x = 1/2$

A. $x^{n-1}\ln x$

B. $x^{n-1}\ln 2x$

*C. $(n-1)x^{n-2}\ln x + x^{n-2}$

D. $(n-1)x^{n-2}\ln x + (n-1)x^{n-2}$

E. $(n-1)x^{n-1}\ln x + (n-1)x^{n-2}$

48. Given that $f(x) = x^2$ in (1, 5) . Obtain the value of c which satisfies the mean value theorem

A. 2

*B. 3

C. -1

D. 1

E. 0

49. Given that $f(x) = x(x-1)(x-2)$ in (0, ½). Obtain the value of c which satisfies the mean value theorem

*A. 0.236

B. 0.5

C. 0.1

D. 1

E. -1

50. If $f(x) = \ln x$ within the interval (e^2, e^3). Obtain the value of c which satisfies the mean value theorem.

*A. $(e-1)e^2$

B. (e -1)

C. (e -2)

D. 2(e -1)

E. e^2

51. Which of the following is true for the mean value theorem, given a function f(x) =1 -3x in the interval (1, 4)

A. The value is not in the interval

*B. It satisfies any value in the interval

C. It is not well posed

D. None of the above

E. All of the above

52. If f(x) =cosx in (0, π/2), Obtain the value of c which satisfies the mean value theorem.

A. cosx

B. $\sin^{-1}(1/\pi)$

*C. $\sin^{-1}(2/\pi)$

D. $\cos^{-1}(2/\pi)$

E. $\sin^{-1}(-1/\pi)$

53. Obtain the Maclaurin series for f(x) $=e^x$

A. $1 + x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \ldots$

B. $x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots$

C. $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \ldots$

*D. $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots$

E. $1 + x + \frac{x^2}{2!} + \frac{x^4}{4!} + \ldots$

54. Obtain the Maclaurin series for f(x) =sinx

A. $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots$

B. $1 + x + \frac{x^2}{2!} + \frac{x^4}{4!} + \ldots$

C. $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots$

D. $x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \ldots$

*E. $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots$

55. Obtain the Taylor's series expansion for the function $f(x) = \sinh x$ at $x = 0$

*A. $x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \ldots$

B. $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \ldots$

C. $1 + x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \ldots$

D. $1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \frac{x^5}{5!} + \frac{x^7}{7!} - \ldots$

E. None of the above

56. Obtain the Taylor's series expansion for the function $f(x) = \cosh x$ at $x = 0$

*A. $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \ldots$

B. $1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \ldots$

C. $1 + x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \ldots$

D. $1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \frac{x^5}{5!} + \frac{x^7}{7!} - \ldots$

57. Evaluate $\lim_{x \to 1} \frac{1 + \ln x - x}{1 - 2x + x^2}$

A. 1

*B. -1/2

C. ½

D. -1

E. 0

58. Evaluate $\lim\limits_{x \to 0} \dfrac{e^{ax} - e^{-ax}}{\ln \ (1 \ + bx)}$

A. a

B. x

*C. 2a/b

D. a/b

E. 1/b

59. Obtain the value of $\lim\limits_{x \to 1} \dfrac{x^2 - 1}{x^2 \ + 1}$

A. -1

*B. 1

C. ½

D. 0

E. ∞

60. Obtain the value of $\lim\limits_{x \to \infty} \dfrac{x^n}{e^x}$

A. -1

B. 1

C. ½

*D. 0

E. ∞

61. Evaluate $\lim\limits_{x \to 1} \left[\dfrac{x}{x - 1} - \dfrac{1}{\ln x}\right]$

A. -1

B. 1

*C. ½

D. 0

E. ∞

62. Find the value of $\lim\limits_{x \to \infty} (e^x \ + x)^{1/x}$

A. -1

B. 1

C. ½

*D. e

E. ∞

63. Find the value of $\lim_{x \to \pi/2} (\tan x)^{\tan 2x}$

A. -1

*B. 1

C. ½

D. e

E. ∞

64. Find the value of $\lim_{(x, y) \to (0,0)} \frac{x^2 + y^2}{y^2 - x^2}$

A. -1

B. 1

*C. Does not exist

D. e

E. 0

65. Obtain $\frac{\partial w}{\partial x}$ if $w = e^x \cos y$

A. $\cos y$

B. $e^x \sin y$

*C. $e^x \cos y$

D. $-e^x \cos y$

E. $e^x \operatorname{cosec} y$

66. Obtain $\frac{\partial w}{\partial y}$ if $w = e^x \cos y$

A. $\cos y$

*B. $-e^x \sin y$

C. $e^x \cos y$

D. $-e^x \cos y$

E. e^{x}cosecy

67. If w =$\tan^{-1}\frac{y}{x}$, find $\frac{\partial w}{\partial x}$

*A. $-y/(x^2 + y^2)$

B. $(x^2 + y^2)/ -y$

C. $-y/(x^2 + y^2)/ -y$

D. $-x/(x^2 + y^2)$

E. $-y/(x^2 - y^2)$

68. If w =$\tan^{-1}\frac{y}{x}$, find $\frac{\partial w}{\partial y}$

A. $-y/(x^2 + y^2)$

B. $(x^2 + y^2)/ -y$

C. $-y/(x^2 + y^2)/ -y$

*D. $x/(x^2 + y^2)$

E. $-y/(x^2 - y^2)$

69. If f(x,y,z,w) =$x^2e^{2y+3z}\cos 4w$, obtain $\frac{\partial f}{\partial w}$

*A. $-4x^2e^{2y+3z}\sin 4w$

B. $4x^2e^{2y+3z}\sin 4w$

C. $x^2e^{2y+3}\cos 4w$

D. $-x^2e^{2y+3}\cos 4w$

E. $x^2e^{2y+3z}\sin 4w$

70. If f(x,y,z,w) =$x^2e^{2y+3z}\cos 4w$, obtain $\frac{\partial f}{\partial z}$

A. $-4x^2e^{2y+3z}\sin 4w$

B. $4x^2e^{2y+3z}\sin 4w$

*C. $3x^2e^{2y+3z}\cos 4w$

D. $-x^2e^{2y+3}\cos 4w$

E. $x^2e^{2y+3z}\sin 4w$

71. find $\frac{\partial^3 U}{\partial x\partial y\partial z}$ if U =$e^{x^2+y^2+z^2}$

*A. $8xyzU$

B. $xyzU$

C. $8xyz$

D. $8xzU$

E. $x^2 + y^2 + z^2$

72. If $U = \ln(x^3 + y^3 - x^2 y - xy^2)$, then obtain the value of $U_{xx} + 2U_{xy} + U_{yy}$

*A. $-4/(x + y)^2$

B. $4/(x + y)^2$

C. $-4/(x - y)^2$

D. $4/(x - y)^2$

E. $(x - y)^2/y$

73. If $f(x,y,z) = z\sin^{-1}(y/x)$ find $\frac{\partial f}{\partial x}$

*A. $-yz/\sqrt{x^4 - x^2y^2}$

B. $yz/\sqrt{x^4 - x^2y^2}$

C. $yz/\sqrt{x^4 + x^2y^2}$

D. $-yz/\sqrt{x^4 - x^2y^2}$

E. $-yz/\sqrt{x^4 + x^2y^2}$

74. if $f(u,v,w) = \frac{u^2 - v^2}{v^2 + w^2}$, find $\frac{\partial f}{\partial v}$

A. $2v(v^2 + w^2)/(v^2 + w^2)^2$

*B. $-2v(v^2 + w^2)/(v^2 + w^2)^2$

C. $-2v(v^2 + w^2)/(v^2 - w^2)^2$

D. $-2v(v^2 - w^2)/(v^2 + w^2)^2$

E. $2v(v^2 - w^2)/(v^2 + w^2)^2$

75. if $f(u,v,w) = \frac{u^2 - v^2}{v^2 + w^2}$, find $\frac{\partial f}{\partial w}$

*A. $-2w(u^2 - v^2)/(v^2 + w^2)^2$

B. $-2v(v^2 + w^2)/(v^2 + w^2)^2$

C. $-2v(v^2 + w^2)/(v^2 - w^2)^2$

D. $-2v(v^2 - w^2)/(v^2 + w^2)^2$

E. $2v(v^2 - w^2)/(v^2 + w^2)^2$

76. if $z = x^2 + 2y^2$, $x = r\cos\theta$, $y = r\sin\theta$, Obtain the value of $\left(\frac{\partial z}{\partial x}\right)_y$

*A. $2x$

B. $2y$

C. $2z$

D. x

E. y

77. if $z = x^2 + 2y^2$, $x = r\cos\theta$, $y = r\sin\theta$, Obtain the value of $\left(\frac{\partial z}{\partial x}\right)_\theta$

A. $2x(1 - 2\tan^2\theta)$

B. $x(1 + 2\tan^2\theta)$

*C. $2x(1 + 2\tan^2\theta)$

D. $2x(1 + \tan^2\theta)$

E. $2x(2\tan^2\theta)$

78. If $= x^2 + y^2 + z^2$, $x = e^{2t}$, $y = e^{2t}\cos 3t$, $z = e^{2t}\sin 3t$, find $\frac{du}{dt}$

A. 8

B. $2e^{2t}$

*C. $8e^{2t}$

D. $6e^{2t}$

E. $4e^{2t}$

79. Find the total differential coefficient of x^2y with respect to x where x,y are connected by

$$x^2 + xy + y^2 = 1$$

A. $2xy + x^2(2x + y)/(x + 2y)$

B. $2xy - x^2(2x - y)/(x + 2y)$

*C. $2xy - x^2(2x + y)/(x + 2y)$

D. $2xy - x^2(2x - y)/(x - 2y)$

E. $2xy + x^2(2x - y)/(x + 2y)$

80. The altitude of a right circular cone is 15cm and is increasing at 0.2cm/sec. The radius of the base is 10cm and is decreasing at 0.3cm/sec. how fast is the volume changing?

*A. $-70\pi/3cm^2s^{-1}$

B. $70\pi/3cm^2s^{-1}$

C. $-70\pi/3cm^2$

D. $70\pi/3cm^2$

E. $-70\pi cm^2s^{-1}$

81. The altitude of a right circular cone is 15cm and is increasing at 0.2cm/sec. The radius of the base is 10cm and is decreasing at 0.3cm/sec. At what rate is the volume decreasing?

*A. $-70\pi/3cm^2s^{-1}$

B. $70\pi/3cm^2s^{-1}$

C. $-70\pi/3cm^2$

D. $70\pi/3cm^2$

E. $-70\pi cm^2s^{-1}$

82. If $U = \tan^{-1}(y/x)$ and at $x = e^t - e^{-t}$, $y = e^t + e^{-t}$ find $\frac{dy}{dx}$

A. $-2/(e^{2t} - e^{-2t})$

B. $-2/(e^{2t} - e^{-2t})$

C. $2/(e^{2t} - e^{-2t})$

D. $2/(e^{2t} + e^{-2t})$

*E. $-2/(e^{2t} + e^{-2t})$

83. In other that the function $U = 2xy - 3x^2y$ remains constant. what should be the rate of change of y given thatx increases at the rate of 2cm/s at the instant when $x = 3cm$ and $y = 1cm$

*A. $-32/21cms^{-1}$

B. $32/21cms^{-1}$

C. $-32/2cms^{-1}$

D. $-32cms^{-1}$

E. $32cms^{-1}$

84. Find the rate at which the area of a rectangle is increasing at a given instant when the sides of the rectangle are 4ft and 3ft and increasing at the rate of 1.5ft/sec and 0.5ft/sec respectively.

A. 4sqft/sec

B. 3sqft/sec

C. 12sqft/sec

*D. 6.5sqft/sec

E. 0.75sqft/sec

85. if $u = x^2 - y^2$, $x = 2r - 3s + 4$, $y = -r + 8s - 5$, obtain $\frac{du}{dr}$

A. $2r - 3s + 4$

B. $-r + 8s - 5$

*C. $2(2x + y)$

D. $(2x + y)$

E. $(2x - y)$

86. if $u = x^2 - y^2$, $x = 2r - 3s + 4$, $y = -r + 8s - 5$, obtain $\frac{du}{ds}$

A. $2r - 3s + 4$

B. $-r + 8s - 5$

*C. $-6x - 16y$

D. $(2x + y)$

E. $(2x - y)$

86. If $x^5 + y^5 = 5a^3x^2$ Obtain $\frac{d^2y}{dx^2}$

*A. $6a^3x^2(a^3 + x^3)/y^9$

B. $6a^3x^2(a^3 - x^3)/y^9$

C. $6a^3(a^3 + x^3)/y^9$

D. $6a^3x^2(a^3 + x^3)/y^3$

E. $a^3x^2(a^3 + x^3)/y^9$

87. Compute $\frac{\partial z}{\partial x}$ at (1,-1, 2) if $x^2 + y^2 + z^2 = a^2$

A. 0

B. 1

*C. -1/2

D. -1

E. 2

88. Compute $\frac{\partial z}{\partial x}$ at (1,-1, 2) if $x^2 + y^2 + z^2 = a^2$

A. 0

*B. 1

C. -1/2

D. -1

E. 2

89. If $y = 2 - 2x + 4x^3$, find $\frac{d^3y}{dx^3}$

A. 24x

B. 0

*C. 24

D. x

E. -24

90. Obtain the Stationary point for the function $y = 2x^3 + 3x^2 - 12x + 4$

*A. (1, 3), (-2, 24)

B. (3, 1), (-24, 2)

C. (-1, -3), (-2, 24)

D. (1, 3), (-2, -24)

E. (-1, 3), (-2, 24)

91. Which of the Stationary points for the function $y = 2x^3 + 3x^2 - 12x + 4$ gives the maximum

A. (-1, 3)

B. (3, 1),

*C. (-2, 24)

D. (1, 3),

E. (-24, 2)

92. Which of the Stationary points for the function $y = 2x^3 + 3x^2 - 12x + 4$ gives the minimum

A. (-1, 3)

B. (3, 1),

C. (-2, 24)

*D. (1, 3),

E. (-24, 2)

93. If $x^2 + xy + y^4 = 7$ find $\frac{dy}{dx}$

*A. $-(2x + y)/(x + 4y^3)$

B. $(2x + y)/(x + 4y^3)$

C. $-(2x + y)/(x + 4y^3)$

D. $-(2x + y)/4y^3$

E. $(2x + 3y)/(x + 4y^3)$

94. $\int x\cos x\,dx =$

*A. $x\sin x + \cos x + c$

B. $\sin x + \cos x + c$

C. $x\sin x + \cos x$

D. $x\sin x - \cos x + c$

E. $x\cos x + \sin x + c$

95. $\int_0^{\frac{\pi}{2}} x\cos x\,dx$

A. 0

B. 2

C. 1

*D. $\frac{\pi}{2} - 1$

E. $\frac{\pi}{2}$

96. $\int x\sin x\,dx =$

A. $x\sin x + \cos x + c$

B. $\sin x + \cos x + c$

C. $x\sin x + \cos x$

D. $x\sin x - \cos x + c$

*E. $-x\cos x + \sin x + c$

97. $\int_0^{\frac{\pi}{2}} x\cos x dx$

A. 0

B. 2

*C. 1

D. $\frac{\pi}{2}$ -1

E. $\frac{\pi}{2}$

98. Evaluate the line integral $I = \int_c (x^2 + 2y)dx + (x + y^2)dy$ from A (0, 1) to B(2, 3) along the curve c, defined by $y = x + 1$.

*A. 64/3

B. 64

C. 32/3

D. 32

E. 1/32

99. Evaluate $\int_c (x + 2y)dx$ from A (0, 1) to B (1, 0) along the curve c defined by $y = 1 - x$.

A. -1

*B. 1

C. 0

D. 2

E. -2

100. Evaluate $I = \int_c \{(x + y)dx + xydy\}$ from O (0, 0) to A(1,0) along the line $y = 0$ and from A(1,0) to B(1,1) along the line $x = 1$

*A. -1

B. 2

C. -2

D. 0

E. 1

101. Compute the partial derivative of the function $f(x, y, z) = e^{1 - x\cos y} + z\, e^{-1/(1 + y^2)}$ with respect to x at the point (1, 0, π).

*A. -1

B. −1/e

C. 0

D. π/e

E. π

102. The maximum value of $(xy)^6$ on the ellipse $\frac{x^2}{4}$ $+y^2$ $=1$ occurs at a point (x,y) for which y^2 is equal to

A. √ 2/3

*B. 1/2

C. 2/3

D. 5/11

E. 10/11

103. The tangent plane to the graph of the function $z = x^2y + 1/(1 + y^2)$ at the point (1, 1, 3/2) contains point (2, 2, t) for which value of t?

A. $8\frac{1}{5}$

B. 1 + 7/ 4 √ 2

*C. 4

D. 5

E. none of the above

104. Which of the quantities is nearest to the value of $\exp\left(\frac{0.003}{1.001}\right)\cos(0.002)$?

A. 1

B. 1.001

C. 1.002

*D. 1.003

E. 1.000006

105. Given $5e^{3x} + \sin x$, $\frac{dy}{dx}$ is

A. $5e^{3x} + \sin x$

*B. $15e^{3x}$ +cosx

C. $15e^{3x}$ -cosx

D. $5e^{3x}$ -sinx

E. e^{x}

106. Given y =sin2x, $\frac{dy}{dx}$ at x = 3 is most nearly

A. 0.9600

B. 0.9945

*C. 1.920

D. 1.989

E. 0

107. Given x^3ln x, $\frac{dy}{dx}$ is

A. x^3lnx

*B. $3x^2$lnx

C. $3x^2$lnx $+x^2$

D. 2 x

E. 3x

108. The velocity of a body as a function of time is given as (t) $=5e^{-2t}$ +4 , where t is in seconds, and v is in m/s. The acceleration in at m/s^2 t = 6.0s is

*A. -3.012

B. 5.506

C. 4.147

D. -10.00

109. If x^2 +2xy $=y^2$, then $\frac{dy}{dx}$ is

*A. x +y/(y -x)

B. 2x+2y

C.(x +1)/y

D. – x

E. -2

110. Find the minimum distance from the point (4, 2) to the parabola $y^2 = 8x$.

A. 4√3

*B. 2√2

C. √3

D. 2√3

E. 2

111. A triangle has variable sides x, y, z subject to the constraint such that the perimeter is fixed to 18 cm. What is the maximum possible area for the triangle?

*A. 15.59 cm2

B. 18.71 cm2

C. 17.15 cm2

D. 14.03 cm2

E. -17.15 cm2

112. A farmer has enough money to build only 100 meters of fence. What are the dimensions of the field he can enclose the maximum area?

*A. 25 m x 25 m

B. 15 m x 35 m

C. 20 m x 30 m

D. 22.5 m x 27.5 m

E. 10 m x 35 m

113. Find the minimum amount of tin sheet that can be made into a closed cylinder having a volume of 108 cu. inches in square inches.

*A. 125.50

B. 127.50

C. 129.50

D. 123.50

E. 250.50

114. Find the derivative of the function $f(x) = \sin x \cos x$

A. $\sin^2 x \cos x$

*B. $\cos^2 x - \sin^2 x$

C. $\cos^2 x + \sin^2 x$

D. $-\cos^2 x - \sin^2 x$

E. $-\cos^2 x + \sin^2 x$

115. Evaluate $\lim_{x \to \infty} \frac{5x + 4}{x^2 + 2x - 1}$

A. $-\infty$

B. 0

*C. 1

D. 5

E. $-\infty$

116. The cost fuel in running a locomotive is proportional to the square of the speed and is $25 per hour for a speed of 25 miles per hour. Other costs amount to $100 per hour, regardless of the speed. What is the speed which will make the cost per mile a minimum?

A. 40 mph

B. 55 mph

*C. 50 mph

D. 45 mph

117. If f(x) $=\sqrt{x}$, find $f^{11}(4)$

A. -1/2

*B. -1/32

C. 0

D. 1/8

E. 2

118. The coordinates (x, y) in feet of a moving particle P are given by x = cost – 1 and y = 2sint – 1, where t is the time in seconds. At what extreme rates in fps is P moving along the curve?

A. 3 and 2

B. 3 and 1

C. 2 and 0.5

*D. 2 and 1

E. 3 and 1

119. find the critical numbers of y $=4x^3 -x^4$

A. 0

B. 2

*C. 0 and 3

D. 0 and 4

E. No critical number

120. The slope of the tangent to the curve y $=x^3$ +5 at the point (1,2) is

A. 6

B. 2

C. 5

*D. 3

E. None of the above

121. Water is pouring into a swimming pool. After t hours, there are t + √t gallons in the pool. At what rate is the water pouring into the pool when t = 9 hours?

*A. 7/6 gph

B. 8/7 gph

C. 6/5 gph

D. 5/4 gph

E. 1/5 gph

121. A balloon is rising vertically over a point A on the ground at the rate of 15 ft./sec. A point B on the ground level with and 30 ft. from A. When the balloon is 40 ft. from A, at what rate is its distance from B changing?

A. 13 ft/sec

B. 15 ft/sec

*C. 12 ft/sec

D. 10 ft/sec

E. 23 ft/sec

122. The function $f(x) = x^4 - 6x^2$ is increasing on the intervals

A. (0, √ 3) only

B. (−∞, − √ 3) and (0, √ 3) only

C. (√ 3, ∞) only

*D. (− √ 3, 0) and (√ 3, ∞) only

E. None of the above

123. The function $f(x) = x^4 - 6x^2$ is concave down on the intervals

*A. (−1, 1) only

B. $(-\sqrt{3}, \sqrt{3})$ only

C. $(-\infty, -1)$ and $(1, \infty)$ only

D. $(1, \sqrt{3})$ only

E. None of the above

124. The linear approximation of at $x = 1$ is $\sqrt{5 - x}$

*A. $y = -1/4\, x + 9/4$

B. $y = -3/4\, x + 7/4$

C. $y = 1/4\, x + 7/4$

D. $y = -3/4\, x + 9/4$

E. $y = 1/4\, x - 7/4$

125. Car A moves due East at 30 kph at the same instant car B is moving S 30° E , with a speed of 60 kph. The distance from A to B is 30 km. Find how fast is the distance between them separating after one hour.

A. 36 kph

B. 38 kph

C. 40 kph

*D. 45 kph

E. 38 kph

126. A function is given below, what x value maximizes y?

$$y^2 + y + x^2 - 2x = 5$$

A. 2.23

B. -1

C. 5

*D. 1

E. 5

127. The number of newspaper copies distributed is given by $C = 50t^2 - 200t + 10000$ where t is in years. Find the minimum number of copies distributed from 1995 to 2002.

A. 9850

*B. 9800

C. 10200

D. 7500

E. 9500

128. The cost C of a product is a function of the quantity x of the product is given by the relation: $C(x) = x^2 - 4000x + 50$. Find the quantity for which the cost is a minimum.

A. 3000

*B. 2000

C. 1000

D. 1500

E. 2500

129. A rectangular field is to be fenced into four equal parts. What is the size of the largest field that can be fenced this way with a fencing length of 1500 feet if the division is to be parallel to one side?

A. 65,200

*B. 62,500

C. 64,500

D. 63,500

E. 65,500

130. The function f is given by $f(x) = x^4 + 4x^3$. On which of the following intervals is f decreasing?

A. (-3, 0)

B. $(0,\infty)$

*C. $(-3,\infty)$

D. $(-\infty, -3)$

E. $(-\infty, 0)$

131. The value of c that satisfies the mean value theorem on the interval [0,5] for the function $f(x) = x^3 - 6x$ is

A. $-5/\sqrt{3}$

B. 0

C. 1

D. 5/3

*E. $-5/\sqrt{3}$

132. The graph of the function $y = x^3 + 12x^2 + 15x + 3$ has a relative maximum at x =

A. -10.613

B. -0.248

*C. -7.317

D. -1.138

E. -0.683

133. If $x^3 + y^3 = 3cx^2$, obtain the derivative $\frac{dy}{dx}$

*A. $(2cx - x^2)/y^2$

B. $2cx + x^2/y^2$

C. $2cx - x^2/y^2$

D. $2cx + x^2/y^2$

E. $2cx - x^2$

134. if $u^3 + xy - y^2u = 6$. Obtain the value of $\frac{\partial^2 y}{\partial x^2}$ at (0, 1, 2)

A. ¼

*B. -1/11

C. 6

D. 1

E. 2

135. Find the area of the surface generated by revolving the curve with parametric equations $x(u) = 3t(u - 2)$, $y(u) = 8u^{\frac{3}{2}}$

*A. 39π

B. -39π

C. 8π

D. 3π

E. 39/2π

136. Evaluate $\iint_D (u^2 + v^2)dudv$, where D is bounded by $v = u$, $v^2 = 4u$

A. 384/35

B. 768/35

C. -384/35

*D. 768/35

E. None of the above

137. Find the derivative of the function $f(u) = \sin u \cos u$

A. $\sin^2 u \cos u$

*B. $\cos^2 u - \sin^2 u$

C. $\cos^2 u + \sin^2 u$

D. $-\cos^2 u - \sin^2 u$

E. $-\cos^2 u + \sin^2 u$

138. Evaluate $\lim_{u \to \infty} \frac{5u + 4}{u^2 + 2u - 1}$

A. $-\infty$

B. 0

*C. 1

D. 5

E. $-\infty$

139. Evaluate $\int_0^{\frac{\pi}{2}} \sin^7 u du$

A. 6/7

B. 4/5

C. 2/3

D. 3/8

*E. 16/35

140. Obtain the derivative of $y = e^{ax}\cos(mx + c)$

*A. $e^{ax}[a\cos(mx + c) - m\sin(mx + c)]$

B. $e^{ax}\cos(mx + c)$

C. $a\cos(mx + c)$

D. $-m\sin(mx + c)$

E. $-a\cos(mx + c)$

141. Given that $y = u^2 \sin u$, obtain $\frac{dy}{du}$

A. $u^2 \cos u$

B. $\cos u$

C. $\sin u$

*D. $u^2 \cos u + 2u \sin u$

E. $u^2 \cos u - 2u \sin u$

142. Obtain the derivative of $y = v^{n-1} \ln v$ at $v = 1/2$

A. $v^{n-1} \ln v$

B. $v^{n-1} \ln 2v$

*C. $(n-1)v^{n-2} \ln v + v^{n-2}$

D. $(n-1)v^{n-2}\ln v + (n-1)v^{n-2}$

E. $(n-1)v^{n-1}\ln v + (n-1)v^{n-2}$

143. Given that $f(r) = r^2$ in (1, 5) . Obtain the value of c which satisfies the mean value theorem

A. 2

*B. 3

C. -1

D. 1

E. 0

144. A statue 3 m high is standing on a base of 4 m high. If an observer's eye is 1.5 m above the ground, how far should he stand from the base in order that the angle subtended by the statue is a maximum?

A. 3.41 m

B. 3.51 m

*C. 3.71 m

D. 4.41 m

E. 4.43

145. An iron bar 20 m long is bent to form a closed plane area. What is the largest area possible?

A. 21.56 square meter

B. 25.68 square meter

C. 28.56 square meter

*D. 31.83 square meter

E. 22.56 square meter

146. If $f(m) = \sqrt{m}$, find $f^{11}(4)$

A. -1/2

*B. -1/32

C. 0

D. 1/8

E. 2

147. If $f(x) = \ln x$ within the interval (u^2, u^3). Obtain the value of c which satisfies the mean value theorem.

*A. $(u-1)u^2$

B. $(u-1)$

C. $(u-2)$

D. $2(u-1)$

E. u^2

148. Evaluate $\lim_{x \to 0} \frac{e^{ax} - e^{-ax}}{\ln(1+cx)}$

A. a

B. x

*C. 2a/c

D. a/c

E. 1/c

149. $\int_0^{\frac{\pi}{2}} u \cos u du$

A. 0

B. 2

*C. 1

D. $\frac{\pi}{2} - 1$

E. $\frac{\pi}{2}$

150. The side of a square is increasing at a constant rate of 0.4cm/sec. In terms of the parameter p. what is the rate of change of the area of the square in cm^2/sec?

A. 0.05p

*B. 0.2p

C. 0.4p

D. 6.4p

E. 51.2p