FY CS   CALCULUS   SEMESTER 2

1. A function in which every element of co-domain has a pre-image in domain is called
   a) Injective
   b) Surjective
   c) Bijective
   d) Invertible

2. A function f is concave down on an interval I if for all x ∈ I
   a) $f'(x) < 0$
   b) $f'(x) > 0$
   c) $f''(x) < 0$
   d) $f''(x) > 0$

3. In which of the following methods, we approximate solution of curve by tangent in each interval?
   a) Simpson's method
   b) Newton's method
   c) Euler's method
   d) Hoffman's method

4. Point where concavity of curve changes is called
   a) Cusp
   b) Point of minima
   c) Point of maxima
   d) Point of inflection

5. The horizontal asymptote of the function f(x) = $\frac{1}{x}$ is
   a) y = 0
   b) x = 0
   c) y = 1
   d) x = 1

6. Derivative of the function $xlogx$ is
   a) 1+ logx
   b) 1/x
   c) $\frac{x}{1+x}$
   d) $\frac{1+x}{x}$

7. Find the interval in which the function f(x) = x² is decreasing?
   a) $(0, \infty)$
   b) $(-\infty, 0)$

c) (0,2)

d) (2,0)

8. $\lim\limits_{x\to\infty} \dfrac{1}{2x}$ is

 a) ½

 b) 0

 c) 1

 d) ∞

9. The rate of change of one variable with respect to another is called

 a) Continuity

 b) Integral

 c) Derivative

 d) Critical point

10. If $f(x,y) = y\sin x - e^x, then\ f_{yx}$ is

 a) cosx

 b) –cosx

 c) sinx

 d) –sinx

11. Critical point of the function f(x,y) = $x^3 - y^3$ is

 a) (3,3)

 b) (2,2)

 c) (1,1)

 d) (0,0)

12. $\lim\limits_{(x,y,z)\to(2,1,1)} \dfrac{x(y^2-z^2)}{(x+2)(y-z)}$ is

 a) 1

 b) 2

 c) 3

 d) 4

13. The unit vector of 3i + j is

 a) $\dfrac{3i + j}{\sqrt{10}}$

 b) $\dfrac{3i + j}{2}$

 c) $\dfrac{3i + j}{4}$

d) $\frac{3i + j}{10}$

14. Gradient vector of $f(x, y) = x^2 + y^2$ at (1,2) is
    a) (1,4)
    b) (2,4)
    c) (5,0)
    d) (0,5)

15. Function f decreases most rapidly at point u when v is a unit vector
    a) In the direction of ∇f
    b) In the direction of $-\nabla f$
    c) Perpendicular to ∇f
    d) Making angle $\frac{\pi}{4}$ $with$ ∇f

16. For a function f, $f_{xx} = r, f_{yy} = t, f_{xy} = s.$ If $rt - s^2 < 0$ at the critical point, then the point is
    a) Local maxima
    b) Local minima
    c) Cusp
    d) Saddle point

17. $f(x, y) = y^3 - x^2 + xy,$ $then$ f_{yy} is
    a) 6y + 1
    b) 6y
    c) 6y + x
    d) 6y − 2x

18. Area under the curve y = x² over the interval [-1, 1] is
    a) 1/3
    b) 2/3
    c) 1
    d) 4/3

19. $\int_{1}^{2} 3x^2 dx$ is
    a) 6
    b) 7
    c) 8
    d) 9

20. Solution of differential equation $\frac{dy}{dx} = \frac{y}{x}$ is
   a) logy = logx + c
   b) $\frac{y^2}{2} = logx + c$
   c) $logy = \frac{x^2}{2} + c$
   d) $\frac{y^2}{2} = \frac{x^2}{2} + c$

21. $\int cosec^2 x \, dx$ is
   a) cotx + c
   b) −cotx + c
   c) cosecx cot x + c
   d) -cosecx cot x + c

22. $\int 3x^2 sin(x^3 + 2)dx$ is
   a) $cos(x^3 + 2) + c$
   b) $-cos(x^3 + 2) + c$
   c) $x^3 cos(x^3 + 2) + c$
   d) $-x^3 cos(x^3 + 2) + c$

23. Integrating factor of differential equation $\frac{dy}{dx} + \frac{4}{x}y = x$ is
   a) 4logx
   b) logx
   c) x^4
   d) x^3

24. Which of the following method is used to find the integral of a function?
   a) Newton's method
   b) Euler's method
   c) Simpson's method
   d) Hoffman's method

25. $\int_{-\pi/2}^{\pi/2} sinx \, dx$ is
   a) $\pi/2$
   b) π
   c) 1
   d) 0