MCQ Practice sheet

Unit ~~4~~ 5

Set1

1. $U=x+y$, $x=t$, $y=t^2$, find dU/dt

   a. 1+2t b. t+2 C. T D. 2-t

2. If $z=x^3+y^3-3axy$, find $\frac{\partial z}{\partial x}$

   a. $3x^2-3ay$ b. $3x^2+3ay$ c. x^2-3ay d. none of these

3. If $u=\frac{x+y}{\sqrt{x}+\sqrt{y}}$, which of the following is correct

   a. u is homogeneous function with degree 1/2
   b. u is not homogeneous function
   c. u is homogeneous function with degree 1
   d. u is homogeneous function with degree -1/2

4. If $\log u=\frac{x+y}{\sqrt{x}+\sqrt{y}}$, which of the following is correct

   a. log u is homogeneous function with degree 1/2
   b. u is homogeneous function with degree 1/2
   c. u is homogeneous function with degree -1/2
   d. u is not homogeneous function

5. To find extreme value of $x^2+y^2+z^2$ such that $Ax+By+Cz=D$, which of the following is correct

   a. $\frac{\partial F}{\partial x}=0, \frac{\partial F}{\partial y}=0, \frac{\partial F}{\partial z}=0$ where $F= x^2+y^2+z^2+\lambda(Ax+By+Cz-D)$
   b. $\frac{\partial F}{\partial x}=0, \frac{\partial F}{\partial y}=0, \frac{\partial F}{\partial z}=0$ where $F= x^2+y^2+z^2+\lambda(Ax+By+Cz=D)$
   c. $\frac{\partial F}{\partial x}=0, \frac{\partial F}{\partial y}=0, \frac{\partial F}{\partial z}=0$ where $F= x^2+y^2+z^2+Ax+By+Cz-D$
   d. $\frac{\partial F}{\partial x}=0, \frac{\partial F}{\partial y}=0, \frac{\partial F}{\partial z}=0$ where $F= (x^2+y^2+z^2)(Ax+By+Cz=D)$

6. The minimum value of the function $x^2+y^2+z^2$ subject to the condition $xyz=a^3$ if $x^2=y^2=z^2$ is obtained by Lagrange's method is

   a. $3a^2$ b. a^2 c. $6a^2$ d. none of these

SET 2

1.

$$\text{If } u=\frac{y^3-x^3}{y^2+x^2} \text{ then } x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2} \text{ is}$$

(a) 3u (b) 2u (c) u (d) 0

2.If F(x,y) is a homogeneous function of degree n in x and y and has continuous first and second order partial derivatives then

a) $x^2\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial x \partial y} + y^2\frac{\partial^2 f}{\partial y^2} = n(n-1)f$

b) $x^2\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial x \partial y} + y^2\frac{\partial^2 f}{\partial y^2} = nf$

c) $x^2\frac{\partial^2 f}{\partial x^2} + 2xy\frac{\partial^2 f}{\partial x \partial y} + y^2\frac{\partial^2 f}{\partial y^2} = n(n-1)f$

d) $x^2\frac{\partial^2 f}{\partial x^2} + 2xy\frac{\partial^2 f}{\partial x \partial y} + \frac{\partial^2 f}{\partial y^2} = n(n-1)f$

3.

If $r = \frac{\partial^2 f}{\partial x^2}(a,b)$, $s = \frac{\partial^2 f}{\partial x \partial y}(a,b)$, $t = \frac{\partial^2 f}{\partial t^2}(a,b)$, then $f(x,y)$ will have a maxima at(a,b) if

a) $rt > s^2$, and $r < 0$

b) $rt > s^2$, and $r > 0$

c) $rt = s^2$, and $r < 0$

d) $rt = s^2$, and $r > 0$

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For the function $f(x,y) = 2(x^2 - y^2) - x^4 + y^4$ the critical point(1,0) is a point of

a) Maxima b) Minima c) saddle point d) None of these

5.

If $x = \cos\theta$, $y = \sin\theta$ then $\frac{\partial(x,y)}{\partial(r,\theta)}$ is

(a) 0 (b) 1 (c) 2 (d) 3

6.

If $f(x,y) = x^3 + y^3 + x$ then $\frac{\partial f}{\partial x}$ & $\frac{\partial f}{\partial y}$ is

a) $3x^2 + 3y^2 + 1, 3y^2 + 1$ b) $3x^2 + 1, 3y^2$ c) $x^2 + 1, y^2$ d) $3x^2, y^2$

7.

. Total derivative of $z = \tan^{-1}\left(\frac{x}{y}\right), (x,y) \neq (0,0)$ is

a) $\frac{ydx+ydy}{x^2+y^2}$ b) $\frac{ydx-xdy}{x^2+y^2}$ c) $ydx - xdy$ d) $ydx + xdy$

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If $w = x^2 + y^2, x = \frac{t^2-1}{t}, y = \frac{t}{t^2+1}$ then $\frac{dw}{dt}$ at $t = 1$ is

(a) 0 (b) 1 (c) 2 (d) 3

9. If F $(x_1, x_2, x_3, \dots\dots\dots x_n, \lambda_1, \lambda_2, \lambda_3 \dots\dots \lambda_k)$ =

f$(x_1, x_2, x_3, \dots\dots\dots x_n) + \sum_{i=1}^{k} \lambda_i \phi_i(x_1, x_2, x_3, \dots\dots\dots x_n)$

The necessary conditions to determine the stationary points of F

(a) $\frac{\partial F}{\partial x_1} = 0 = \frac{\partial F}{\partial x_2} = \frac{\partial F}{\partial x_3} = \dots\dots = \frac{\partial F}{\partial x_n}$

(b) $\frac{\partial F}{\partial x_1} = \frac{\partial F}{\partial x_2} = \frac{\partial F}{\partial x_3} = \dots\dots = \frac{\partial F}{\partial x_n}$

(c) $\frac{\partial F}{\partial x_1} = 0 = -\frac{\partial F}{\partial x_2} = -\frac{\partial F}{\partial x_3} = \dots\dots = \frac{\partial F}{\partial x_n}$

(d) $-\frac{\partial F}{\partial x_1} = 0 = \frac{\partial F}{\partial x_2} = \frac{\partial F}{\partial x_3} = \dots\dots = -\frac{\partial F}{\partial x_n}$

10. If f(x,y) = $\sqrt{a^2 - x^2 - y^2}$, critical point (x,y) is (0 ,0) ,this is a point of
   (a) relative minimum (b) relative maximum (c) neither maximum or minimum (d) saddle point

11.If $z = f(x, y)$ *where* $x = g(t), y = h(t)$ *then* $\frac{dz}{dt}$ is equal to
(a) $\frac{\partial z}{\partial x}\frac{\partial x}{\partial t} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial t}$ (b) $\frac{\partial z}{\partial x}\frac{\partial x}{\partial t} - \frac{\partial z}{\partial y}\frac{\partial y}{\partial t}$ (c) $\frac{\partial z}{\partial x}\frac{dx}{dt} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial t}$ (d) $\frac{\partial z}{\partial x}\frac{dx}{dt} + \frac{\partial z}{\partial y}\frac{dy}{dt}$

12.If z = $\sqrt{xy}$ then $\frac{\partial^2 z}{\partial x \partial y}$ is equal to
   (a) 4z (b) $\frac{4}{z}$ (c) $\frac{z}{4}$ (d) $\frac{1}{4z}$

13. The function $f(x, y) = \begin{cases} \frac{2x(x^2 - y^2)}{x^2 + y^2}, & (x, y) \neq (0, 0) \\ 0, & (x, y) = (0, 0) \end{cases}$
   (a) continuous at(x,y) =(0,0) (b) not continuous at(x,y) =(0,0)
   (c) limit does not exist (d) none of these

14.The value of the $\lim_{(x,y) \to (0,0)} \frac{xy}{x^2 + 2y^2}$, $x \neq 0, y \neq 0$ is
   (a)0 (b)1 (c) limit does not exist (d) -1

15. If u = x(1+y) , v = xy then value of Jacobian $\frac{\partial(u,v)}{\partial(x,y)}$ is
   (a) (a)-x (b) x (c) y (d) -y

SET3

1.
If $f(x, y) = x^4 - x^2y^2 + y^4$ then $\frac{\partial f}{\partial x}$ at $(-1,1)$ is
(a)-2 (b)2 (c)1(d)-1

2.
If $z = \log\left[\frac{x^2 - y^2}{x^2 + y^2}\right]$, then $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y}$ is
   (a) 0 (b) z (c) 2z (d) 3z

3.

If $\cot^{-1}\left(\frac{x}{y}\right) + y^3 + 1 = 0, x > 0, y > 0$ then $\frac{dy}{dx}$ is

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

4. If $r = f_{xx}(u,v)$, s = $f_{xy}(u,v)$, t = $f_{yy}(u,v)$ then if r t - $s^2 < 0$ then f(x,y) has no Maximum or minimum at this point (u,v) ,then the point is called

(a) Saddle point (b) Maximum point (c) Minimum Point (d)none of these

5. If $x = r\cos\theta, y = r\sin\theta$ then $\frac{\partial(x,y)}{\partial(r,\theta)}$

(a) 1 (b) r (c) 0 (d) $\frac{1}{r}$

6. If z = f(x,y) , x = x(r,s) , y =y(r,s) then $\frac{\partial z}{\partial r}$ is equal to

(a) $\frac{\partial z}{\partial x}\frac{\partial x}{\partial r} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial r}$ (b) $\frac{\partial z}{\partial x}\frac{\partial x}{\partial s} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial s}$ (c) $\frac{\partial z}{\partial x}\frac{\partial x}{\partial r} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial s}$ (d) $\frac{\partial z}{\partial x}\frac{\partial x}{\partial s} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial r}$

7.If f(x,y) = $x^2 + y^2 + 2bxy$, the critical point (x,y) is (0 , 0) is a point of minimum ,so the minimum value at (0,0) is

(a) 0 if $|b| = 1$ (b) 0 if $|b| < 1$ (c) 0 if b > 1 (d) 0 if $|b| > 1$

8.If f(x,y) = $4x^2 + 9y^2 - 8x - 12y + 4$, the critical point (x,y) is (1 , $\frac{2}{3}$) ,this is a point of

(a) relative minimum (b) relative maximum (c) neither maximum or minimum (d) saddle point

9.

If $u = x^3 + y^3$, then $\frac{\partial^2 u}{\partial x^2}$ is

a) $3x^2$ b) $6x$ c)6 d) 0

10.

If $u = \frac{x^3+y^3}{x+y}, (x, y) \neq (0,0)$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial v}$ is

(b) 3u (b) 2u (c) u (d) 0

11.

If $u = \cos^{-1}\left[\frac{x+y}{\sqrt{x}+\sqrt{y}}\right]$, $0 < x < 1$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is

a) 0 b) $2u$ c) $-\frac{1}{2}\cot u$ d) None of these

12.If f(x,y) = $3x^2 + y^2 - x$ then the critical point (x,y) is

(a) $\left(-\frac{1}{6}, 0\right)$ (b) $\left(-\frac{1}{6}, 1\right)$

(c) $\left(\frac{1}{6}, 1\right)$ (d) $\left(\frac{1}{6}, 0\right)$

13.If $x = r\cos\theta, y = r\sin\theta$ then $\frac{\partial(r,\theta)}{\partial(x,y)}$

(b) 1 (b) r (c) 0 (d) $\frac{1}{r}$

14.Which of the following is not homogeneous function

(a) $\tan^{-1}\left[\frac{x}{y}\right]$ (b) $\frac{x^3 + y^3}{x-y}$ (c) $\frac{y^3 - x^3}{x^2 + y^2}$ (d) $\cos^{-1}\left[\frac{x+y}{x^2 + y^2}\right]$

15. If $u = x^2y + 2y^2x$ then the value of $\frac{\partial^2 u}{\partial x\,\partial y}$ is equal to

(a) 2x + y (b) 2x + 2y (c) 2x + 4y (d) x + 4y

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$f(x,y) = \frac{\sqrt{x^2+y^2}}{x}$ is a homogeneous function of degree

(b) 0 (b) 1 (c) 2 (d) -1

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If $u = \cos^{-1}\left[\frac{x}{y}\right]$ then $\frac{\partial u}{\partial x}$ equals to

(a) $\frac{1}{\sqrt{y^2-x^2}}$ (b) $\frac{-1}{\sqrt{y^2-x^2}}$ (c) $\frac{1}{\sqrt{x^2-y^2}}$ (d) none of these

18.The function

$$f(x,y) = \begin{cases} \frac{xy}{x^2+2y^2}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$$

(a) continuous at(x,y) =(0,0) (b) not continuous at(x,y) =(0,0) (c) limit does not exist (d) none of these

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The function

$f(x,y) = \left\{\frac{\sin^{-1}(x+2y)}{\tan^{-1}(2x+4y)}, \quad (x,y) \neq (0,0)\right.$ is continuous at(x,y) =(0,0), the value of f(x,y) at (0,0) is

(a) 0 (b) -1 (c) $\frac{1}{2}$ (d) does not exist

Set4

1. The value of $\underset{(x,y)\to(0,0)}{lt} \dfrac{x}{\sqrt{x^2+y^2}}$ is

(a) $\dfrac{1}{2}$ (b) does not exist (c) $\dfrac{1}{4}$ (d) none of these.

2. The value of $\underset{(x,y)\to(0,0)}{lt} \dfrac{xy^2}{x^2+y^4}$ is

(a) $\dfrac{1}{2}$ (b) does not exist (c) $\dfrac{1}{4}$ (d) none of these.

3. The value of $\underset{(x,y)\to(0,1)}{lt} \dfrac{(y-1)\sin x}{x\log y}$ is

(a) 1 (b) $\dfrac{1}{2}$ (c) does not exist (d) none of these.

4. If $f(x,y)=\begin{cases} \dfrac{xy}{x^2+y^2} & ,\ (x,y)\neq(0,0) \\ 0 & ,\ (x,y)=(0,0) \end{cases}$ then

(a) $f(x,y)$ is not continuous at (0,0) (b) $f(x,y)$ is not defined at (0,0) (c) $f(x,y)$ is continuous at (0,0) (d) none of these

5. If $f(x,y)=x^y$ then $f_y(x,y)$ is

(a) 0 (b) yx^{y-1} (c) $x^y \log x$ (d) $x\,y^{x-1}$

.

7. If $w=xyz$, $x=t$, $y=(t+1)$, $z=e^t$ hen $\dfrac{dw}{dt}$ at $t=0$ is

(a) 1 (b) 2 (c) 3 (d) 0

8. If $f(x,y)=\dfrac{x}{\sqrt{x^2+y^2}}$ then $f_x(1,1)$

(a) 4 (b) $\dfrac{1}{4}$ (c) 2 (d) $\dfrac{1}{2\sqrt{2}}$

9. If $u=\cos^{-1}\left(\dfrac{\sqrt{x^2+y^2}}{x+y}\right)$ then $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}$ is

(a) 0 (b) $\dfrac{1}{2}$ (c) 1 (d) 2

10. If $r=f_{xx}(a,b)$, $s=f_{xy}(a,b)$, $t=f_{yy}(a,b)$ then $f(x,y)$ will have the minimum value at (a,b) if

(a) $f_x=0, f_y=0$, $rt-s^2<0$ and $r<0$

(b) $f_x=0, f_y=0$, $rt-s^2>0$ and $r>0$

(c) $f_x=0, f_y=0$, $rt-s^2>0$ and $r<0$

(d) $f_x=0, f_y=0$, $rt-s^2<0$ and $r>0$

11. If $f(x,y)=y^2e^{\frac{x}{y}}$ then $f_y(1,1)$ is

(a) $2e^{1/2}$ (b) e (c) $\dfrac{2}{e}$ (d) $\dfrac{4}{\sqrt{e}}$

12. If $f(x,y)=x^2\cot^{-1}\left(\dfrac{y}{x}\right)$ then it is homogeneous function of degree

(a) 1 (b) 0 (c) 2 (d) none of these

13. If $f(x,y,z)=e^{\frac{y}{x^2}}+\log\left(\dfrac{y}{z}\right)$ then $f_x(1,1,1)$ is

(a) $\dfrac{1}{2}$ (b) $\dfrac{1}{3}$ (c) 1 (d) none of these

14. If $x^3+y^3+3xyz=1$ then value of $\left(\dfrac{\partial y}{\partial x}\right)_z$ is

(a) $\dfrac{x^2+yz}{y^2+xz}$ (b) $-\dfrac{x^2+yz}{y^2+xz}$ (c) $\dfrac{x^2}{xz}$ (d) none of these

15. Which of the following function is a homogeneous function of degree = -2

(a) $\dfrac{1}{x^2+y^2}$ (b) x^2+y^2 (c) $\dfrac{1}{x-y^2}$ (d) $\dfrac{1}{xy+y}$

UNIT ~~5~~ 6

Set1

1. Area enclosed by y=f1(x) and f2(x) and b$\le x \le a$ is given by
   a. $\int_{x=a}^{x=b}\int_{y=f1(x)}^{y=f2(x)} dxdy$
   b. $\int_{x=a}^{x=b}\int_{y=f1(x)}^{y=f2(x)} zdxdy$
   c. $\int_{x=a}^{x=b}\int_{y=a}^{y=b} dxdy$
   d. None of these
2. Evaluate $\int_{x=0}^{x=1}\int_{y=0}^{y=2} xdxdy$
   a. 1 b. 2 c. 3 d. 4
3. Evaluate $\int_{x=0}^{x=1}\int_{y=0}^{y=2}\int_{z=0}^{3} dz\,dxdy$
   a. 6 b. 3 c. 2 d. 1
4. Find area enclosed by $x^2+y^2=4$, $x\ge 0$, $y\ge 0$
   a. π b. 2π c. 3π d. 4π
5. Find volume of $x^2+y^2+z^2=1$, $x\ge 0$, $y\ge 0$, $z\ge 0$
   b. $\pi/3$ b. $2/3\pi$ c. $3\pi/2$ d. $4\pi/3$

6. Which of the following is correct

a. $\iint dxdy = \iint rdrd\theta$

b. $\iint dxdy = \iint 2rdrd\theta$

c. $\iint dxdy = \iint r^2\, drd\theta$

d. $\iint dxdy = \iint rcos\theta drd\theta$

7. Change the order of $\int_{x=0}^{x=a} \int_{y=\sqrt{ax}}^{y=a} dxdy$

   a. $\int_{y=0}^{y=a} \int_{x=0}^{x=y^2/a} dxdy$

   b. $\int_{y=0}^{y=a} \int_{x=a}^{x=y^2/a} dxdy$

   c. $\int_{y=0}^{y=1} \int_{x=0}^{x=y^2/a} dxdy$

   d. None of these

8. Volume bounded by $x^2+y^2=4$ and y+z=4,z=0 is given by

   a. $\int_{y=-2}^{y=2} \int_{x=-\sqrt{4-y^2}}^{x=\sqrt{4-y^2}} \int_{z=0}^{4-y} dz\; dxdy$

   b. $\int_{y=0}^{y=2} \int_{x=-\sqrt{4-y^2}}^{x=\sqrt{4-y^2}} \int_{z=0}^{4-y} dz\, dxdy$

   c. $\int_{y=-2}^{y=2} \int_{x=0}^{x=\sqrt{4-y^2}} \int_{z=0}^{4-y} dz\, dxdy$

   d. None of these

Set 2

1.The value of integral $\int_0^2 \int_1^3 xy\; dy\; dx$ is (a) 2 (b) 4 (c) 8 (d) 0

2.$\int_0^1 \int_0^y e^y\; dx\; dy$ is (a) 1 (b) 0 (c) 2 (d) -1

3.$\int_1^2 \int_0^1 2x\, e^{x^2}\; dx\; dy$ is (a) e +1 (b) e (c) -e (d) e -1

4.$\int_0^1 \int_0^y e^{\frac{x}{y}}\; dx\; dy$ is (a) $\frac{1}{2}[\mathrm{e}+1]$ (b) $\frac{1}{2}$e (c) -$\frac{1}{2}$e (d) $\frac{1}{2}[\mathrm{e}-1]$

5. The value of integral $\int_0^{\frac{\pi}{2}} \int_a^{a(1+cos\theta)} r\; dr\; d\theta$

(a) $(\pi+8)\frac{a^2}{4}$ (b) $(\pi+8)\frac{a^2}{2}$ (c) -$(\pi+8)\frac{a^2}{4}$ (d) $-(\pi+8)\frac{a^2}{2}$

6.$\int_0^1 \int_0^{x^2} x\; e^y\; dy\; dx$ is (a) $e-1$ (b) $\frac{1}{2}e-1$ (c) $1-e$ (d) $\frac{1}{2}$e

7. To change Cartesian coordinates (x,y,z) to cylindrical coordinates (r,$\theta, z)$ dxdydz is replaced

(a) r $d\theta\; dz$ (b)r dr $d\theta\; dz$ (c) r sin θ dr $d\theta\; dz$(d) sin θdr $d\theta\; dz$

8. After changing the order of integration, the integral $\int_{-a}^{a}\int_0^{\sqrt{a^2-y^2}} f(x,y)dx\; dy$

(a) $\int_{-a}^{a}\int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} f(x,y)dy\; dx$ (b) $\int_0^a \int_0^{\sqrt{a^2-x^2}} f(x,y)dy\; dx$

(c) $\int_{-a}^{a}\int_0^{\sqrt{a^2-x^2}} f(x,y)dy\; dx$ (d) $\int_0^a \int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} f(x,y)dy\; dx$

9. After changing to polar coordinates, the integral $\int_0^{2a} \int_0^{\sqrt{2ax-x^2}} dx\; dy$

(a) $\int_0^{\frac{\pi}{2}} \int_0^{2a\; cos\theta} r\; d\theta\; dr$ (b) $\int_0^{\pi} \int_0^{a\; cos\theta} rd\theta\; dr$

(c) $\int_0^{\frac{\pi}{2}}\int_0^{a\cos\theta} r\, d\theta\, dr$ (d) $\int_0^{\pi}\int_0^{2a\cos\theta} r d\theta\, dr$

10.After changing the order of integration, the integral $\int_0^a\int_x^a f(x,y)dx\, dy$

(a) $\int_0^a\int_a^y f(x,y)dy\, dx$ (b) $\int_0^a\int_0^x f(x,y)dy\, dx$

(c) $\int_0^a\int_0^y f(x,y)dy\, dx$ (d) $\int_{-a}^a\int_0^y f(x,y)dy\, dx$

11.The value of the integral $\int_0^a\int_0^b\int_0^c x^2y^2z^2$ dz dy dx is (a) $\frac{abc}{9}$ (b) $\frac{a^2b^2c^2}{27}$ $(c)\,\frac{a^3b^3c^3}{27}$ $(d)\,\frac{a^2b^2c^2}{9}$

12.After changing the order of integration the integral $\int_0^1\int_0^{\sqrt{1-x^2}}(x+y)dy\, dx$

$\int_0^1\int_0^{\sqrt{1-y^2}}(x+y)\, dxdy$ (b) $\int_0^2\int_0^{\sqrt{1-y^2}}(x+y)dxdy$

$(c)\int_0^1\int_0^{\sqrt{1+y^2}}(x+y)dxdy$ $(d)\int_0^{-1}\int_0^{\sqrt{1-y^2}}(x+y)dxdy$

13. Evaluate

$\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}\, dx\, dy$ *by changing to polar coordinates.* $(a)\int_{\theta=0}^{\frac{\pi}{2}}\int_{r=0}^{\infty} e^{(r^2)} r dr\, d\theta$ $(b)\int_{\theta=0}^{\frac{\pi}{2}}\int_{r=0}^{\infty} e^{-(r^2)} r$

$(c)\int_{\theta=0}^{\frac{\pi}{2}}\int_{r=0}^{\infty} e^{-(r^2)}\, dr\, d\theta$ $(d)\int_{\theta=0}^{\frac{\pi}{2}}\int_{r=0}^{\infty} e^{(r^2)}\, dr\, d\theta$

14. The area bounded by circle $x^2+y^2=16$ is 16π (b)π (c) 8$\pi (d) 4\pi$

15.Evaluate the integral $\int\int\int dxdy\, dz$ along R where R is hemisphere of radius a ,

$x^2+y^2+z^2=a^2$ is (a)πa^3 (b)$\frac{\pi a^3}{6}$ $(c)\,\frac{2\pi a^3}{3}$ $(d)\,\frac{\pi a^3}{3}$

SET3

1. The value of integral $\int_1^0\int_0^1(x^2+y^2)\, dx\, dy$ is (a) $\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) $\frac{1}{3}$ (d) - $\frac{1}{3}$

2. The value of integral $\int_{-b}^{b}\int_0^{\sqrt{a^2-y^2}} dydx$ is

$-b\sqrt{a^2-y^2}$ (b) $-2b\sqrt{a^2-y^2}$ (c) $b\sqrt{a^2-y^2}$ (d) none of these

3. $\int_{-b}^{b}\int_0^y dx\, dy$ is (a) 1 (b) 0 (c) 2 (d) -1

4. The value of the integral $\int_0^\pi\int_{2\sin\theta}^{4\sin\theta} r^3\, dr\, d\theta$ is (a)$-\frac{45}{2}\pi$ (b) $\frac{25}{2}\pi$ (c) $\frac{45}{2}\pi$ (d) -$\frac{25}{2}\pi$

5. The value of integral $\int_0^\pi\int_0^{a(1+\cos\theta)} dr\, d\theta$ is (a)$-a\pi$ (b) $a\pi$ (c) $\frac{\pi}{2}$ (d) $-\frac{\pi}{2}$

6. The value of the integral $\int_0^2\int_1^3\int_1^2 x\, y^2 z$ dz dy dx is (a)23(b)26(c)22(d)21

7. To change Cartesian coordinates (x,y) to Polar coordinates (r,θ) dxdy is replaced by (a) r $drd\theta$ (b) dr $d\theta$ (c) r sin θ dr $d\theta$ (d) sin θ dr $d\theta$

8. The value of $\int_0^1\int_x^{\sqrt{x}} xy\, dx\, dy$ is (a) Zero (b) -$\frac{1}{24}$ (c) 24 (d) $\frac{1}{24}$

9. Area between the parabolas $y^2=4x\ and\ x^2=4y$ is (a) $\frac{6}{3}$ (b) $\frac{26}{3}$ (c) $\frac{16}{3}$ (d) $\frac{6}{13}$

10. $evaluate\ \int\int dxdy\ \ over\ the\ area\ bounded\ \ by\ x=0, y=0\ \ 5y=3, x^2+y^2=1$

$\frac{6}{5}+\frac{1}{2}\ sin\frac{3}{5}$ (b) $\frac{6}{25}+\frac{1}{2}\ sin\frac{3}{15}$ (c) $\frac{6}{25}+\frac{1}{2}\ sin\frac{3}{5}$ (d) $\frac{6}{25}$ - $\frac{1}{2}\ sin\frac{3}{5}$

11. The value of the integral $\int_{-1}^{1}\int_0^z\int_{x-z}^{x+z} dy\, dx\, dz\ \ is$ (a) 0 (b) $\frac{4}{3}$ (c) $\frac{-4}{3}$ $(d)\,\frac{2}{3}$

12. The value of the integral $\int_0^a\int_0^b\int_0^c(x^2+y^2+z^2)$)dx dy dz

(a) $\boxed{\frac{abc}{3}}\boxed{[a^2+b^2+c^2]}$ (b) $\boxed{\frac{a^2b^2c^2}{27}[a^2+b^2+c^2](c)\frac{a^3b^3c^3}{27}[a^2+b^2+c^2](d)\frac{a^2b^2c^2}{9}[a^2+b^2+c^2]}$

13. $\boxed{\int_0^2\int_0^{\frac{x}{2}} e^{x^2}\ dy\ dx}$ Is (a) $\boxed{\frac{1}{4}[e^4+1](b)\ \frac{1}{2}[e^4-1]}$ (c) $\boxed{\frac{1}{4}[e^4-1]}$ (d) none of these

14. The cylinder $\boxed{x^2+z^2=1\ is\ cut\ by\ planes}$ z= 0, y =0, x =y .the volume of the region in first octant is

(a) $\boxed{\frac{1}{3}}$ (b) $\boxed{\frac{2}{3}\ (c) -\frac{2}{6}(d)\ \frac{2}{16}}$

15. Volume of sphere $\boxed{x^2+y^2+z^2=1\ is\ given\ as}$

(a) $\boxed{8\int_0^1\int_0^{\frac{\pi}{2}}\int_0^{\frac{\pi}{2}} r^2\ sin\theta\ dr\ d\theta\ d\emptyset}$ (b) $\boxed{8\int_0^a\int_0^{\frac{\pi}{2}}\int_0^{\frac{\pi}{2}} r^2\ sin\theta\ dr\ d\theta\ d\emptyset}$

(c) $\boxed{8\int_{-1}^1\int_0^{\frac{\pi}{2}}\int_0^{\frac{\pi}{2}} r^2\ sin\theta\ dr\ d\theta\ d\emptyset}$ (d) none of these

U4

unit ~~6~~ 4 Fourier series practice problems

For the function $f(x)=x^2, -2\le x\le 2$ the value of b_n in Fourier series expansion will be
(a)$\frac{8}{3}$ (b)0 (c)$\frac{16}{3}$ (d)noneof these Ans-b

For the function $f(x)=x^3$,-$\pi\le x\le\pi$ the value of a_n in Fourier series expansion will be
(a)$\frac{2}{\pi}$ (b)2π (c)0 (d)none of these Ans-c

Fourier series what is the value of Fourier coefficient for a_0 on [-l, l]
(a) $\frac{2}{l}\int_0^l f(x)dx$ (b) $\frac{1}{l}\int_{-l}^l f(x)dx$ (c) $\frac{2}{l}\int_{-l}^l f(x)dx$ (d)
$\frac{2}{l}\int_0^l f(x)\cos\left(\frac{n\Pi x}{l}\right)dx$ Ans- b