Q. 2)

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$$\int_1^4 \int_0^3 (xy + x^2y^3)\,dy\,dx$$

$$\int_1^4 \int_0^3 (xy + x^2y^3)\,dy\,dx$$

$$\Rightarrow \int_1^4 \left[\frac{xy^2}{2} + \frac{x^3y^4}{4} \Big|_0^3 \right] dx$$

$$\Rightarrow \int_1^4 \left[\frac{x(3)^2}{2} + \cancel{\frac{x^3(3)^4}{4}} \right] dx$$

$$\Rightarrow \int_1^4 \frac{9x}{2}\,dx$$

$$\Rightarrow \frac{9x^2}{2\times 2} \Big|_1^4$$

$$\Rightarrow \frac{9x^2}{4} \Big|_1^4$$

$$\Rightarrow \frac{9x^2}{4} \Big|_1^4$$

$$\Rightarrow \frac{9(4)^2}{4} - \frac{9(1)^2}{4}$$

$$\Rightarrow \frac{144}{4} - \frac{9}{4} \Rightarrow \frac{144-9}{4}$$

$$\Rightarrow \cancel{36 - \frac{9}{4}} \Rightarrow \boxed{\frac{135}{4}}$$ Ans

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Q5:- Find value of x and y-

Sol $8x-y=-1$, $7x-y=-2$

Sol:-

$$8x-y=-1 \rightarrow (i)$$

$$7x-y=-2 \rightarrow (ii)$$

Subtracting eq (ii) from (i)

$$\begin{array}{r} 8x-y=-1 \\ \underline{\pm 7x \mp y = \mp 2} \\ x=1 \end{array}$$

put $x=1$ in eq (i)

$$8(1)-y=-1$$

$$8-y=-1$$

$$8+1=-y$$

$$\Rightarrow \boxed{y=9}$$

So $\boxed{x=1}$ and $\boxed{y=9}$

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Q:4 $f(x,y) = xy^2z^4 + 3yz^2$

Sol:- Differentiate w.r.t "x"

$$\frac{d}{dx} f(x,y) = \frac{d}{dx}\left(xy^2z^4 + 3yz^2\right)$$

$$f(x) = \frac{d}{dx} xy^2z^4 + \frac{d}{dx} 3yz^2$$

$$\cancel{f(x) = \frac{d}{dx} x \frac{d}{dx} y^2 \frac{d}{dx} z^4 + \frac{d}{dx} 3 \frac{d}{dx} y \frac{d}{dx} z^2}$$

$$f(x) = y^2 z^4 \frac{d}{dx} x + 3z^2 \frac{d}{dx} y$$

$$\cancel{f(x) = x(0)(0) + 0}$$

$$\cancel{f(x) =}$$

$$f(x) = \frac{d}{dx} xy^2z^4 + \frac{d}{dx} 3yz^2$$

$$f(x) = (1)\, y^2z^4 + 0$$

$$\boxed{f(x = y^2z^4}$$

Q1) ~~Name~~: [redacted]

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$$\int_0^5\int_0^x x(x+3x)\,dy\,dx$$

Sol

$$\Rightarrow \int_0^5\left[\int_0^x x(x+3x)\,dy\right]dx$$

$$\Rightarrow \int_0^5\left[\int_0^x (x^2+3x^2)\,dx\right]dx$$

$$\Rightarrow \int_0^5\left[x^2+3x^2\Big|_0^x\right]dx$$

$$\Rightarrow \int_0^5\left[(x-0)^2-(x-0)^2+3(x-0)^2-3(x-0)^2\right]dx$$

$$\Rightarrow \int_0^5\left[x^2-x^2+3(x^2)-3(x^2)\right]dx$$

$$\Rightarrow \int_0^5\left[x^2-x^2+3x^2-3x^2\right]dx$$

$$\Rightarrow \int_0^5 0$$

$$\Rightarrow \int_0^5 0\,dx$$

$$\Rightarrow \boxed{0} \text{ Ans}$$

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Now w.r.t "s"

$$f(s) = \frac{d}{ds}\left(r \cdot \ln(r^3+s^2)\right)$$

$$= r \frac{d}{ds}\ln(r^3+s^2) + \ln(r^3+s^2)\frac{d}{ds} r$$

$$= r \frac{1}{r^3+s^2}\frac{d}{ds}(r^3+s^2) + \frac{1}{r^3+s^2}\times 0$$

$$= \frac{r}{r^3+s^2}\times(0+2s) + 0$$

$$= \frac{r}{r^3+s^2}\times 2s$$

$$f(s) \Rightarrow \boxed{\frac{2sr}{r^3+s^2}}$$

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③

3)

$f(r,s) = r \cdot \ln(r^3+s^2)$

Sol

Differentiate w.r.t "r"

$f(r) = \frac{d}{dr}(r \cdot \ln(r^3+s^2))$

$= r \frac{d}{dr} \ln(r^3+s^2) + \ln(r^3+s^2) \frac{d}{dr} r$

$\cancel{= \frac{dr}{dr} \frac{1}{\ln(r^3+s^2)} + \ln(r^3+s^2) \frac{dr}{dr}}$

$\cancel{\Rightarrow r \frac{1}{r^3+s^2} + \ln(r^3+s^2)} \; 1$

$\cancel{\Rightarrow \frac{r}{r^3+s^2} + \ln(r^3+s^2)}$

$= r \frac{1}{r^3+s^2} \frac{d}{dr}(r^3+s^2) + \frac{1}{r^3+s^2} \times 1$

$= \frac{r}{r^3+s^2} \; 3r^2+0 + \frac{1}{r^3+s^2}$

$\Rightarrow \frac{3r^3}{r^3+s^2} + \frac{1}{r^3+s^2}$

$f(r) \Rightarrow \boxed{\frac{3r^3+1}{r^3+s^2}}$