

# Practice Exam 3

Subject: \_\_\_\_\_  
 Year: \_\_\_\_\_ Month: \_\_\_\_\_ Date: \_\_\_\_\_

1. a)  $\int_{-2}^2 \int_{y-2}^{2-y} dy dx = 4$

b)  $\int_0^2 \int_0^{\sqrt{r^2 - x^2}} r^2 \cos\theta dr d\theta$

$$\int_0^{\frac{\pi}{2}} \int_0^{\sqrt{5}} r^2 \cos\theta dr d\theta = \frac{4}{5}$$

3 a)  $6n^2 + 26ny^2 - 2n^2y - 3y^2 = 0$

$$a = 6$$

$$b = 3$$

b)  $f_n = 6n^2y + y^3 + 1$

$$\Rightarrow f = 2n^3y + ny^3 + n + g(y)$$

$$\Rightarrow f_y = 2n^3 + 3ny^2 + 2 = 2n^3 + 3ny^2 + \cancel{n} + g'(y)$$

$$\Rightarrow g'(y) = -ny^2 + 2 \Rightarrow g(y) = -\frac{ny^3}{3} + 2y$$

$$\Rightarrow f = 2n^3y + ny^3 + n + \cancel{-\frac{ny^3}{3}} + 2y$$

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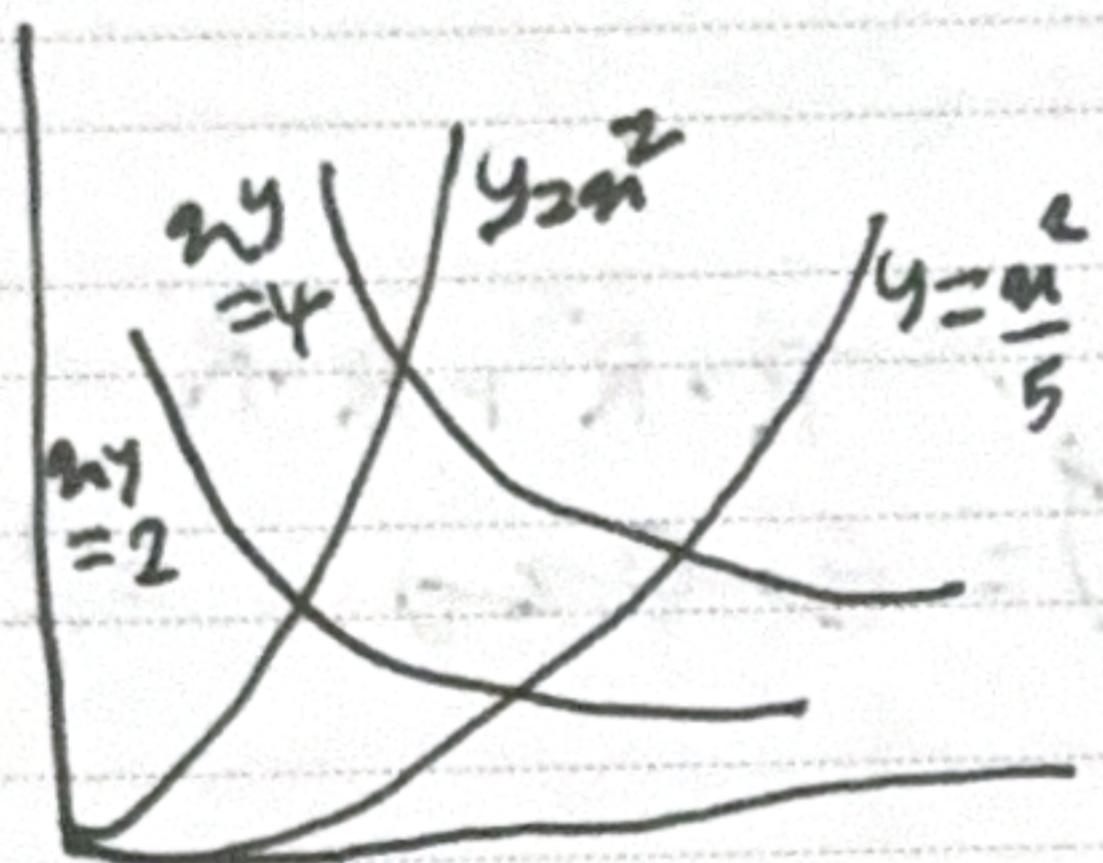
Date.

(c)

$$\int_0^x \sin(6t) e^{t^2} dt = f(x) - f(0) = -e^{-x} - 1$$

$$4. \int_0^1 t^5 + 2t^{4.5} dt = \frac{t^6}{2} \Big|_0^1 = \frac{1}{2}$$

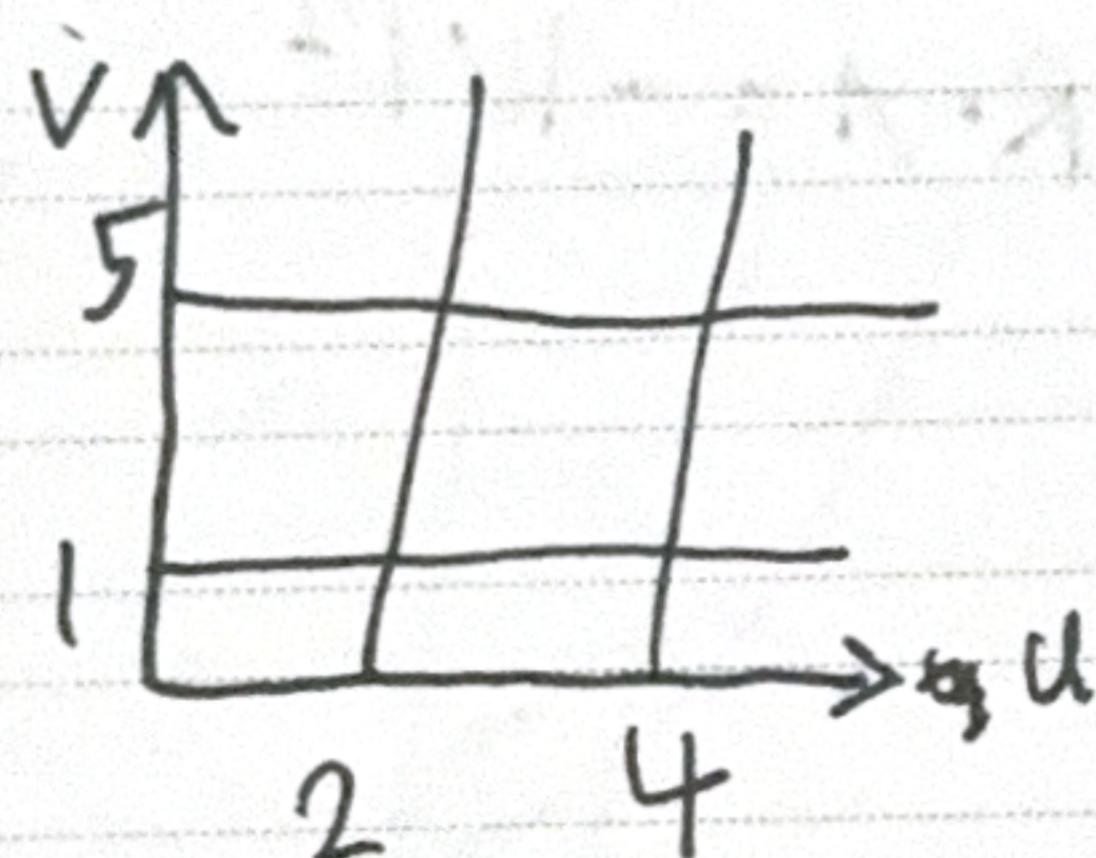
5.



$$U = xy$$

$$V = \frac{x^2}{y}$$

a)



$$\begin{aligned} & \text{4. } \int_{\frac{1}{3}}^{\frac{4}{3}} \int_{\frac{1}{2}v^3}^{\frac{4}{3}v^3} dudv \\ &= \int_1^2 \int_{\frac{1}{2}v^3}^{4v^3} dv \end{aligned}$$

b)

$$= 12 \times \frac{2}{3} h^5$$

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$$6.3 \text{ a) } \iint_R -M_y \, dA$$

$$\text{b) } \iint_R -\frac{M_y}{3} (a+3)^2 \, dA$$

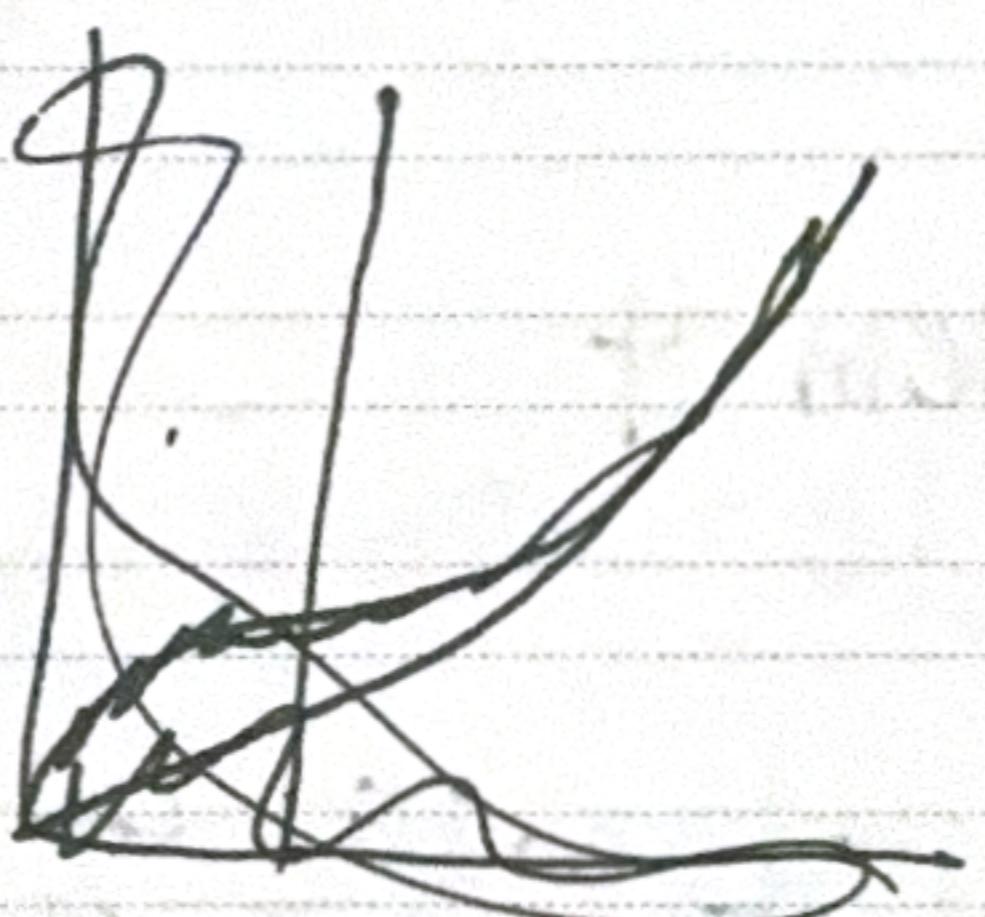
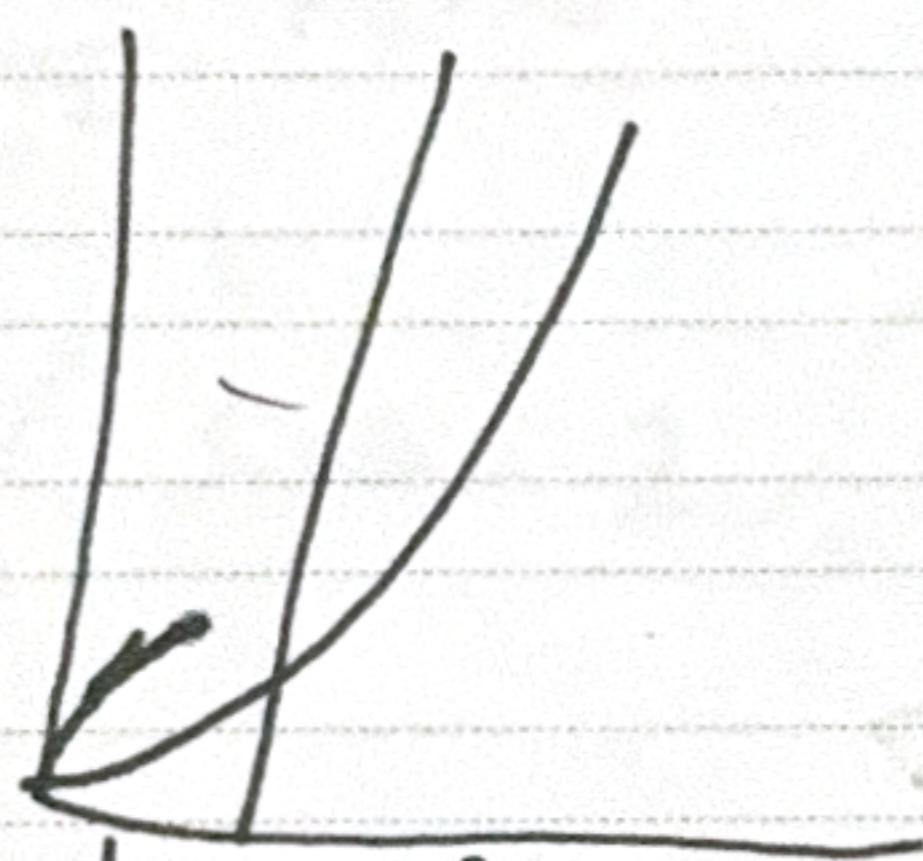
$$= \iint_R \left( \frac{a^3 + y^2 + 2ay}{27(a+3)^2} \right) \, dA$$

$$\Rightarrow 4M_y = -a^2 - y^2 + 2ay$$

$$\Rightarrow M_y = -\frac{a^2}{4} - \frac{y^2}{4} + ay - \frac{1}{3}(a+3)$$

 $\Sigma$ 

7.



a)

$$0 \leq y \leq R \quad 0 \leq x \leq R \quad \text{Area} = \int_0^R \int_0^{R/y} dx dy = \left( \frac{1}{2} + 1 \right) \frac{R^2}{2} = \frac{3}{2} R^2$$

$$= \int_0^1 \int_0^{R/y} x^4 \, dx \, dy = \frac{x^5}{5} \Big|_0^1 = \frac{1}{5} R^5$$

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