

# KEY

Name: \_\_\_\_\_

Math 1432

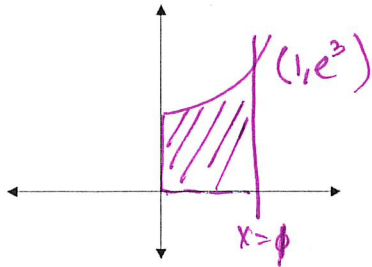
Quiz 2

Version B

PS ID: \_\_\_\_\_

1. (2 pts) Let R be the region bounded by  $f(x) = e^{3x}$ ,  $0 \leq x \leq 1$ . Graph the region.

Write an integral that gives the volume of the object formed by rotating R about the **x-axis**. **Compute the volume.**



Any method can be used

Disk  $\pi \int_0^1 (e^{3x})^2 dx$

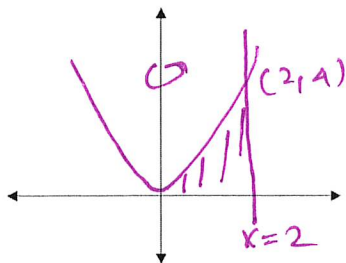
$$= \pi \int_0^1 e^{6x} dx = \pi \frac{e^{6x}}{6} \Big|_0^1$$

$$= \frac{\pi}{6} (e^6 - e^0) = \frac{\pi}{6} (e^6 - 1)$$

2. (2 pts) Let R be the region in the **first quadrant** bounded by  $y = x^2$  and  $x = 2$ . Write an integral that gives the volume of the object formed by rotating R about the **y-axis**

a) using Shell Method.

b) using Disk/Washer Method.



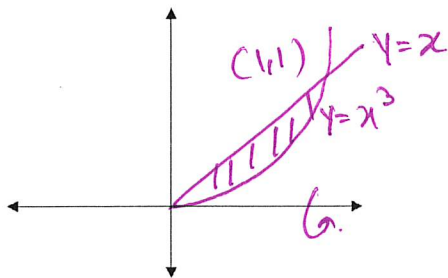
Shell

$$2\pi \int_0^2 x(x^2) dx$$

Disk/Washer

$$\pi \int_0^4 (2)^2 - (\sqrt{y})^2 dy$$

3. (3pts) Let R be the region in the **first quadrant** bounded by  $y = x^3$  and  $y = x$ . Write an integral that gives the volume of the object formed by rotating R about the **x-axis**. **Find the volume.**



Any method can be used.

$$\pi \int_0^1 (x)^2 - (x^3)^2 dx = \pi \int_0^1 x^2 - x^6 dx$$

$$= \pi \left( \frac{x^3}{3} - \frac{x^7}{7} \right) \Big|_0^1$$

$$= \pi \left( \frac{1}{3} - \frac{1}{7} \right) = \frac{4\pi}{21}$$

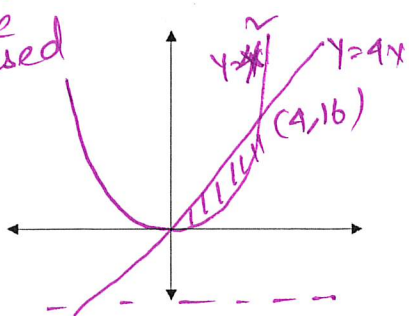
4. (3pts) Let R be the region in the **first quadrant** bounded by  $y = x^2$  and  $y = 4x$ .

a) Write an integral that gives the volume of the object formed by rotating R about the x-axis.

b) Write an integral that gives the volume of the object formed by rotating R about the y-axis.

c) Write an integral that gives the volume of the object formed by rotating R about the line  $y = -2$ .

Any method can be used



$$x^2 = 4x \Rightarrow x(x-4) \Rightarrow x > 0, 4$$

(a) Disk/Washer  $\pi \int_0^4 (4x)^2 - (x^2)^2 dx$

Shell  $2\pi \int_0^{16} y(\sqrt{y} - \frac{y}{4}) dy$

(b)  $\pi \int_0^{16} (\sqrt{y})^2 - (\frac{y}{4})^2 dy$

$2\pi \int_0^4 x(4x - x^2) dx$

If you need more space, you can continue on the back.

(c)  $\pi \int_0^4 (4x+2)^2 - (x^2+2)^2 dx$

$2\pi \int_0^{16} (y+2)(\sqrt{y} - \frac{y}{4}) dy$