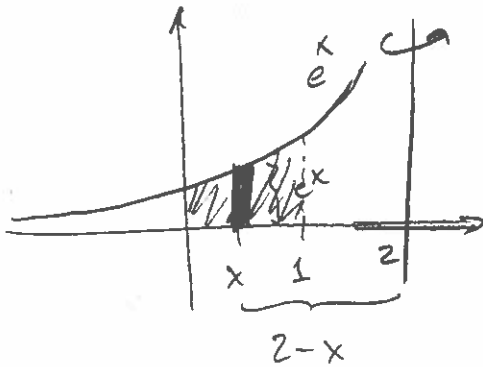


Name: _____ Lehman ID: _____

By writing my name above, I acknowledge complying with the CUNY Academic Integrity Policy while completing this examination.

MAT176 (Spring 2019)
Quiz 2

1. (5 pts) Find the volume of the solid obtained by revolving the region bounded by $y = e^x$ and the x -axis between $x = 0$ and $x = 1$ about the line $x = 2$.



Shell Method:

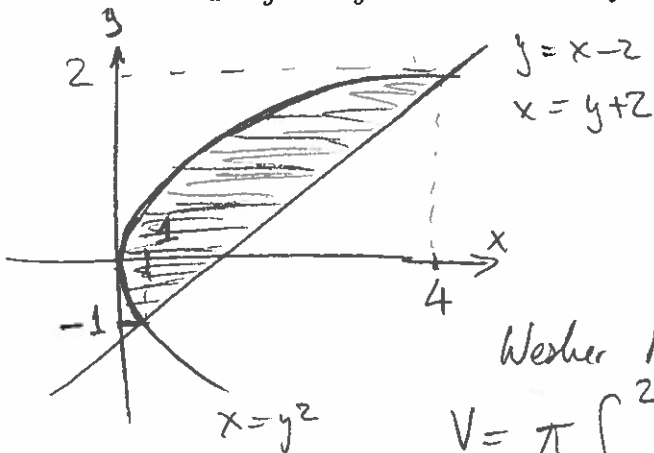
$$V = \int_0^1 2\pi (\text{shell radius})(\text{shell height}) dx$$

$$= 2\pi \int_0^1 (2-x)e^x dx = 2\pi \int_0^1 2e^x - xe^x dx$$

$$= 4\pi e^x \Big|_0^1 - 2\pi (xe^x - e^x) \Big|_0^1 = 4\pi(e-1) - 2\pi(0+1) = \boxed{4\pi e - 6\pi}$$

(or) $\boxed{2\pi(2e-3)}$

2. (5 pts) Find the volume of the solid obtained by revolving the region bounded by $x = y^2$ and $y = x - 2$ about the y -axis.



To find the intersection points:

$$x = y^2 \text{ and } x = y + 2$$

$$\Rightarrow y^2 = y + 2 \Rightarrow y^2 - y - 2 = 0$$

$$\Rightarrow \boxed{y = -1} \text{ and } \boxed{y = 2}$$

$$\Rightarrow (1, -1) \text{ and } (4, 2)$$

Washer Method:

$$V = \pi \int_{-1}^2 (y+2)^2 - (y^2)^2 dy$$

$$= \pi \int_{-1}^2 y^2 + 4y + 4 - y^4 dy$$

$$= \pi \left(\frac{y^3}{3} + 2y^2 + 4y - \frac{y^5}{5} \right) \Big|_{-1}^2 = \boxed{\frac{72\pi}{5}}$$