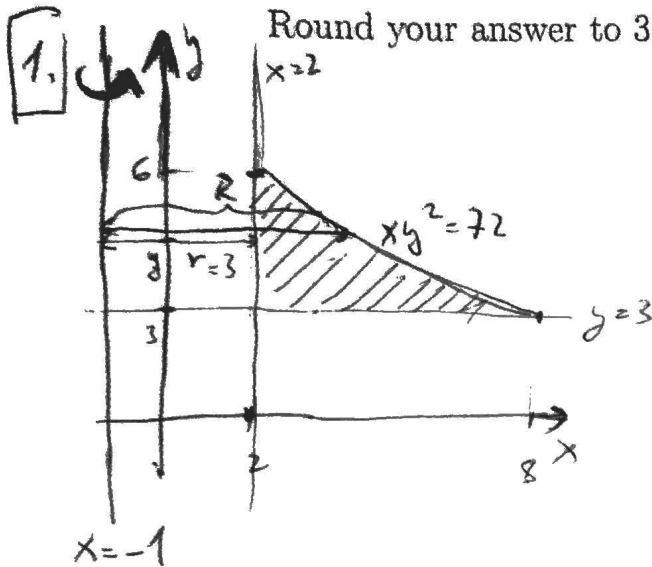


MA 16020 Quiz 7 (Lessons 14-15)

1. Compute the volume of the solid obtained by rotating the region enclosed by the curves $xy^2 = 72$, $y = 3$ and $x = 2$ about the line $x = -1$.
2. Evaluate the integral

$$\int_0^{\infty} 5xe^{-3x^2+2} dx$$



Round your answer to 3 decimal places.

intersections:

$$xy^2 = 72, y = 3$$

$$x \cdot 9 = 72$$

$$x = 8$$

$$xy^2 = 72, x = 2$$

$$2y^2 = 72$$

$$y^2 = 36$$

$$y = \pm 6$$

$$R(y) = \frac{72}{y^2} + 1$$

$$r(y) = 3$$

$$\rightarrow \text{Volume} = \int_3^6 \pi \left(\left(\frac{72}{y^2} + 1 \right)^2 - 3^2 \right) dy =$$

$$= \pi \int_3^6 \left(\frac{72^2}{y^4} + \frac{2 \cdot 72}{y^2} + 1 - 9 \right) dy =$$

$$= \pi \left[\frac{72^2}{(-3)y^3} - 2 \cdot 72y^{-1} - 8y \right]_3^6 =$$

$$= \underline{\underline{56\pi \text{ units}^3}}$$

2.

$$\int_0^{\infty} 5xe^{-3x^2+2} dx = \lim_{a \rightarrow \infty} \int_0^a 5xe^{-3x^2+2} dx = \left. \begin{array}{l} u = -3x^2+2 \\ du = -6x dx \\ x=0 \sim u=2 \\ x=a \sim u = -3a^2+2 \end{array} \right| = \lim_{a \rightarrow \infty} \int_2^{-3a^2+2} -\frac{5}{6} e^u du =$$

$$= \lim_{a \rightarrow \infty} \left[-\frac{5}{6} e^u \right]_2^{-3a^2+2} = \lim_{a \rightarrow \infty} \left(\underbrace{-\frac{5}{6} e^{-3a^2+2}}_{\rightarrow 0 \text{ as } a \rightarrow \infty} + \frac{5}{6} e^2 \right) = \underline{\underline{\frac{5}{6} e^2 \approx 6.158}}$$