

Calculus Study Guide: 7.1

Assume that the rate of rainfall (inches / hour) is recorded at different times during a rainstorm. Here are the data:

Time (in hours)	0	1/3	1/2	3/4	1	1.5
Rate of rainfall	0.4	1	1.6	2	1.4	0.2

About how much rain falls during these 1.5 hours?

Fit trapezoids to the data in the table above to estimate the amount of rainfall.

$$\frac{1}{3}(0.7) + \frac{1}{6}(1.3) + \frac{1}{4}(1.6) + \frac{1}{4}(1.7) + \frac{1}{2}(0.8)$$

1.725 "

answer: \_\_\_\_\_

Estimate the integral using 5 trapezoids with equal width.

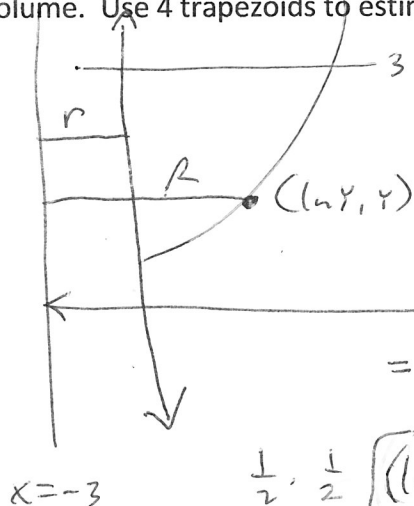
$$\int_0^2 \cos(x^2) dx$$

$$\frac{1}{2}(0.4) \left[ \cos 0 + 2\cos\left(\frac{2}{5}\right)^2 + 2\cos\left(\frac{4}{5}\right)^2 + 2\cos\left(\frac{6}{5}\right)^2 + 2\cos\left(\frac{8}{5}\right)^2 + \cos(2)^2 \right]$$

0.5029

answer: \_\_\_\_\_

The region bordered by  $y = e^x$ ,  $y = 3$  and  $x = 0$  is rotated around the line  $x = -3$ . Set up the integral to find the volume. Use 4 trapezoids to estimate the integral.



$$y = e^x \rightarrow \ln y = x$$

$$R = \ln y + 3$$

$$r = 3$$

$$\pi \int_1^3 (\ln y + 3)^2 - 3^2 dy$$

$$= \int_1^3 (\ln y)^2 + 6 \ln y + 9 - 9 dy = \int_1^3 (\ln y)^2 + 6 \ln y dy$$

$$\frac{1}{2} \cdot \frac{1}{2} \left[ (\ln 1)^2 + 6 \ln 1 + 2((\ln 1.5)^2 + 6 \ln 1.5) \right. \\ \left. + 2((\ln 2)^2 + 6 \ln 2) + 2((\ln 2.5)^2 + 6 \ln 2.5) \right. \\ \left. + \ln 3 + 6 \ln 3 \right] = 2.058$$

$$8.709 \pi$$

answer: \_\_\_\_\_