

Quiz 9

Name: Super Student

USC ID: _____

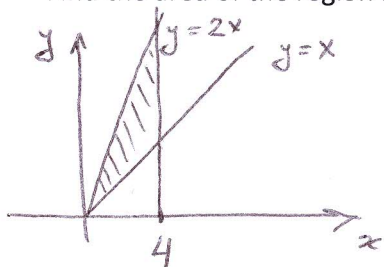
Problem 1 (3 points)

Evaluate the given definite integral using the fundamental theorem of calculus

$$\int_1^4 \frac{1}{\sqrt{v}} dv = \int_1^4 (v)^{-\frac{1}{2}} dv = 2 v^{\frac{1}{2}} \Big|_1^4 = 2(4^{\frac{1}{2}} - 1^{\frac{1}{2}}) = 2(2-1) = \underline{\underline{2}}$$

Problem 2 (3 points)

Find the area of the region bounded by the lines $y=x$, $y=2x$, and $x=4$.



$$A = \int_0^4 (2x - x) dx = \int_0^4 x dx = \frac{x^2}{2} \Big|_0^4 = \underline{\underline{8}}$$

Problem 3 (4 points)

Use integration by parts to find the given integral

$$\begin{aligned} \int (\ln x)^2 dx &= x \cdot (\ln x)^2 - \int x d(\ln x)^2 = x \cdot (\ln x)^2 - 2 \int x \ln x \frac{1}{x} dx \\ &= x \cdot (\ln x)^2 - 2 \int \ln x dx = x (\ln x)^2 - 2 \left(x \cdot \ln x - \int x d \ln x \right) \\ &= x \cdot (\ln x)^2 - 2x \cdot \ln x + 2 \int x \cdot \frac{1}{x} dx \\ &= x (\ln x)^2 - 2x \ln x + 2x + C \end{aligned}$$