

Math 132 Quiz  
8 AM - 9 AM

1. Find the arc length of the graph of  $y = x^{3/2} - \sqrt{x}/3$  between the points  $(1, 2/3)$  and  $(4, 22/3)$ .

$$\begin{aligned} S &= \int_1^4 \sqrt{1 + (f'(x))^2} dx \\ &= \int_1^4 \sqrt{1 + \left(\frac{3}{2}x^{1/2} - \frac{1}{6}x^{-1/2}\right)^2} dx \\ &= \int_1^4 \sqrt{1 + \frac{9}{4}x - \frac{1}{2} + \frac{1}{36x}} dx \\ &= \int_1^4 \sqrt{\frac{9}{4}x + \frac{1}{2} + \frac{1}{36x}} dx \\ &= \int_1^4 \sqrt{\left(\frac{3}{2}x^{1/2} + \frac{1}{6}x^{-1/2}\right)^2} dx \\ &= \int_1^4 \left(\frac{3}{2}x^{1/2} + \frac{1}{6}x^{-1/2}\right) dx \\ &= x^{3/2} + \frac{1}{3}x^{1/2} \Big|_1^4 = \left(8 + \frac{2}{3}\right) - \left(1 + \frac{1}{3}\right) = \frac{22}{3} \end{aligned}$$

2. If  $f(x) = 2/x^2$ ,  $1 \leq x \leq 2$  is the probability density function of a random variable  $X$ , what is the mean  $\mu_X$ ?

$$\begin{aligned} \mu &= \int_1^2 x f(x) dx = \int_1^2 \frac{2}{x} dx \\ &= 2 \ln x \Big|_1^2 \\ &= 2 \ln 2 \end{aligned}$$