

Stats 130
Study Session 1

Elijah Hantman

1. The proportion of People who respond to a certain mail order is a continuous random variable X that has the density function:

$$f(x) = \begin{cases} \frac{2(x+2)}{5} & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

- (a) Show that $P(0 < X < 1) = 1$

$$\int_0^1 \frac{2(x+2)}{5} dx \tag{1}$$

$$= \int_0^1 \frac{2}{5}x + \frac{4}{5} dx \tag{2}$$

$$= \int_0^1 \frac{2}{5}x dx + \frac{4}{5} \tag{3}$$

$$= \frac{2}{5} \int_0^1 \frac{x^2}{2} dx + \frac{4}{5} \tag{4}$$

$$= \frac{2}{5} \times \frac{1}{2} + \frac{4}{5} \tag{5}$$

$$= 1 \tag{6}$$

- (b) Find the probability that more than $\frac{1}{4}$ but fewer than $\frac{1}{2}$ of the people contacted will respond?

$$F\left(\frac{1}{2}\right) - F\left(\frac{1}{4}\right) \tag{7}$$

$$= \int_{\frac{1}{4}}^{\frac{1}{2}} \frac{2(x+2)}{5} dx \tag{8}$$

$$= \int_{\frac{1}{4}}^{\frac{1}{2}} \frac{2}{5}x dx + \frac{1}{5} \tag{9}$$

$$= \frac{2}{5} \int_{\frac{1}{4}}^{\frac{1}{2}} x dx + \frac{1}{5} \tag{10}$$

$$= \frac{3}{80} + \frac{1}{5} \tag{11}$$

$$= \frac{19}{80} = 0.2375 \tag{12}$$