

Math 153 - Quiz 9

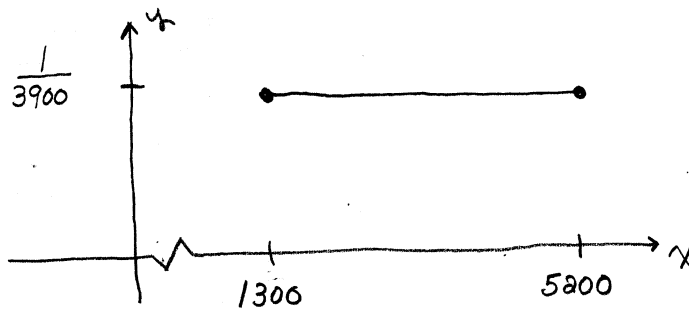
April 12, 2018

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

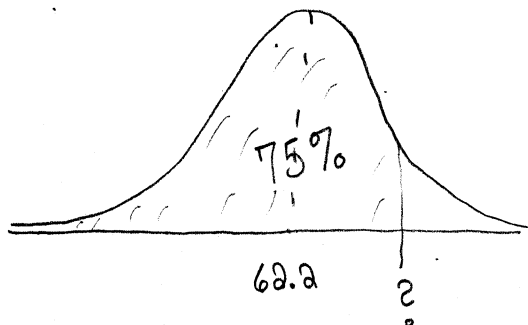
1. (3 points) In a study of small businesses in a certain city, it was found that annual advertising expenses are uniformly distributed between \$1300 and \$5200. Sketch the density curve for the probability distribution. Then determine the percent of small businesses with annual advertising expenses between \$2000 and \$2500.



$$\begin{aligned} P(2000 \leq x \leq 2500) &= \frac{1}{3900} (2500 - 2000) \\ &= \frac{500}{3900} = \boxed{\frac{5}{39}} \end{aligned}$$

$$\begin{aligned} 5200 - 1300 \\ = 3900 \end{aligned}$$

2. (2 points) Employees at a large manufacturing plant worked an average (mean) of 62.2 hours of overtime last year, with a standard deviation of 14.8 hours. Assume the distribution of overtime hours is normally distributed. What amount of overtime is at the 75th percentile?



$$\text{invNorm}(0.75, 62.2, 14.8) \approx \boxed{72.18 \text{ hrs}}$$

3. (5 points) A manufacturer of pain reliever tablets claims that the tablets have weights that are normally distributed with mean 250 mg and standard deviation 4 mg.

(a) What is the probability that a randomly selected tablet weighs between 251 mg and 252 mg?

$$P(251 \leq x \leq 252) = \text{normalcdf}(251, 252, 250, 4) \\ \approx \boxed{0.0928}$$

(b) What is the probability that a randomly selected tablet weighs less than 240 mg?

$$P(x < 240) = \text{normalcdf}(-999999, 240, 250, 4) \\ \approx \boxed{0.0062}$$

(c) A random sample of 32 tablets is obtained. What is the probability the mean weight of the sample is greater than 251.5 mg?

$$\mu_{\bar{x}} = 250 \\ \sigma_{\bar{x}} = \frac{4}{\sqrt{32}} \\ P(\bar{x} > 251.5) \\ = \text{normalcdf}(251.5, 999999, 250, \frac{4}{\sqrt{32}})$$

(d) What is an unusually large mean weight?

$$\approx \boxed{0.0169}$$

$$\mu_{\bar{x}} + 2\sigma_{\bar{x}} \\ = 250 + 2\left(\frac{4}{\sqrt{32}}\right) \approx \boxed{251.4 \text{ mg}}$$