

This quiz covers material from section 8.6. Show your work.

**1.** (2 points) According to a local garage, the lifetimes of car batteries are normally distributed with a mean of 5 years and standard deviation of 1.2 years. Find the probability that a car battery selected at random will last

a. (1 pt) less than 3.2 years.

**Answer:**

$$P(X < 3.2) = P\left(Z < \frac{3.2 - 5}{1.2}\right) = P(Z < -1.50) = 0.0668$$

b. (1 pt) between 5 and 6 years.

**Answer:**

$$\begin{aligned} P(5 < X < 6) &= P\left(\frac{5 - 5}{1.2} < Z < \frac{6 - 5}{1.2}\right) \\ &= P(Z < 0.83) - P(Z < 0) = 0.7967 - 0.5000 = 0.2967 \end{aligned}$$

**2.** (3 points) Jerry buys a box of assorted chocolates. Typically, he only likes 80% of the types of chocolates that are contained in the assortment. Suppose the box contains 150 chocolates. Using the normal approximation to the binomial distribution, compute the probability that Jerry likes more than 125 of the chocolates in the box.

**Answer:** Let  $\mu = (150)(.8) = 120$  and  $\sigma = \sqrt{(150)(.8)(.2)} \approx 4.90$ . We are calculating  $P(X > 125)$ , so our approximation is  $P(X > 125.5)$ . So,

$$P(X > 125.5) = P\left(Z > \frac{125.5 - 120}{4.90}\right) \approx P(Z > 1.12) = P(Z < -1.12) = 0.1314$$

**3.** (3 points) Katie goes door to door selling girl scout cookies. She estimates that the probability of making a sale with each attempt is .40. Using the normal approximation to the binomial distribution, what is the probability that she will make at most 30 sales in 80 attempts?

**Answer:** Let  $\mu = (80)(.4) = 32$  and  $\sigma = \sqrt{(80)(.4)(.6)} \approx 4.38$ . We are calculating  $P(X \leq 30)$ , so our approximation is  $P(X < 30.5)$ . So,

$$P(X < 30.5) = P\left(Z < \frac{30.5 - 32}{4.38}\right) \approx P(Z < -0.34) = 0.3669$$