

1. Use the following to answer questions (a)-(c):

The daily sales at a convenience store produce a distribution that is approximately normal with a mean of 1220 and a standard deviation of 130.

a. The probability that the sales on a given day at this store are more than \$1,405, rounded to four decimal places, is:

$$P(Z > 1.644) = 0.0501$$

$$\begin{aligned} \mu &= 1220 \\ \sigma &= 130 \end{aligned}$$

$$P(X > 1405) = (1405 - 1220) / 130 = 285 / 130 = 2.1923$$

$$P(Z > 2.1923) = 0.0143$$

b. The probability that the sales on a given day at this store are less than \$1,305, rounded to four decimal places, is:

$$P(X < 1305) = (1305 - 1220) / 130 = 85 / 130 = 0.6538$$

$$P(Z < 0.6538) = 0.7432$$

c. The probability that the sales on a given day at this store are between \$1,200 and \$1,300, rounded to four decimal places, is:

$$P(1200 < X < 1300) = P(X < 1300) - P(X < 1200) = (1300 - 1220) / 130 - (1200 - 1220) / 130 = 80 / 130 - (-20) / 130 = 0.6154 + 0.1538 = 0.7692$$

$$P(Z < 0.6154) - P(Z < -0.1538) = 0.7318 - 0.4394 = 0.2924$$

The GMAT scores of all examinees who took that test this year produce a distribution that is approximately normal with a mean of 420 and a standard deviation of 32.

a. The probability that the score of a randomly selected examinee is between 400 and 480, rounded to four decimal places, is:

$$P(400 < X < 480) = P\left(\frac{400 - 420}{32} < Z < \frac{480 - 420}{32}\right) = P(-0.625 < Z < 1.875)$$

$$P(Z < 1.875) - P(Z < -0.625) = 0.9696 - 0.2643 = 0.7053$$

b. The probability that the score of a randomly selected examinee is less than 370, rounded to four decimal places, is:

$$P(X < 370) = P\left[\frac{X - \mu}{\sigma} < \frac{370 - 420}{32}\right] = P(Z < -1.5625) = 0.0594$$

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- c. The probability that the score of a randomly selected examinee is more than 530, rounded to four decimal places, is:

$$P(X > 530) = 1 - P(X < 530) = 1 - P\left[\frac{(X - \mu)}{\sigma} < \frac{(530 - 420)}{35}\right] = 1 - P(Z < 3.14) = 1 - 0.9992$$

3. For the standard normal distribution, the area between  $z = 0$  and  $z = 1.70$ , rounded to four decimal places, is:

$$P(0 < Z < 1.70) = P(Z < 1.70) - P(Z < 0) = 0.9554 - 0.5 = 0.4554$$

4. For the standard normal distribution, the area to the right of  $z = 0.53$ , rounded to four decimal places, is:

$$P(Z < 0.53) = 0.7019 \Rightarrow P(Z > 0.53) = 1 - 0.7019 = 0.2981$$

5. Let  $x$  be a continuous random variable that follows a normal distribution with a mean of 207 and a standard deviation of 42.

Find the value of  $x$  so that the area under the normal curve between  $\mu$  and  $x$  is approximately 0.4996 and the value of  $x$  is greater than  $\mu$ . Round your answer to two decimal places.

$$P(\mu < Z < z) = 0.4996$$
$$P(-0.675 < Z < 0.675) = 0.4996$$
$$z = -0.68 \text{ and } z = 0.68$$
$$x = z\sigma + \mu = 0.68 \cdot 42 + 207 = 235.56$$