

1. $\mu = 4.2$, $\sigma = 0.6$ $Z = \frac{X - \mu}{\sigma}$

(a) $P(4.2 \leq X \leq 5)$

$$P\left(\frac{4.2 - 4.2}{0.6} \leq Z \leq \frac{5 - 4.2}{0.6}\right)$$

$$\begin{aligned} P(0 \leq Z \leq 1.33) &= P(Z \leq 1.33) - P(Z \leq 0) \\ &= 0.9082 - 0.5 \\ &= 0.4082 = 40.82\% \end{aligned}$$

(b) $P(5 \leq X \leq 6)$

$$P\left(\frac{5 - 4.2}{0.6} \leq Z \leq \frac{6 - 4.2}{0.6}\right)$$

$$\begin{aligned} P(1.33 \leq Z \leq 3) &= P(Z \leq 3) - P(Z \leq 1.33) \\ &= 0.9987 - 0.9082 \\ &= 0.0905 = 9.05\% \end{aligned}$$

(c) $P(4 \leq X \leq 6)$

$$P\left(\frac{4 - 4.2}{0.6} \leq Z \leq \frac{6 - 4.2}{0.6}\right)$$

$$\begin{aligned} P(-0.33 \leq Z \leq 3) &= P(Z \leq 3) - P(Z \leq -0.33) \\ &= 0.9987 - 0.3707 \\ &= 0.628 = 62.8\% \end{aligned}$$

(d) $P(Z > k) = 0.04$

~~1 - P~~

$$P(Z < k) = 1 - 0.04 = 0.96$$

$$Z = 1.75$$

$$Z = \frac{X - \mu}{\sigma}$$

$$1.75 = \frac{X - 4.2}{0.6}$$

$$X = 1.75(0.6) + 4.2 = 5.25 \text{ minutes}$$

2. $\mu = 22, \sigma = 8$

(a) $P(X < 15)$

$$P\left(Z < \frac{15 - 22}{8}\right) = P(Z < -0.875)$$

$$= 0.1908 = 19.08\%$$

(b) $P(25 < X < 32)$

$$P\left(\frac{25 - 22}{8} < Z < \frac{32 - 22}{8}\right)$$

$$P(0.38 < Z < 1.25) = P(Z < 1.25) - P(Z < 0.38)$$

$$= 0.8944 - 0.648$$

$$= 0.2464 = 24.64\%$$

(c) $P(Z < k) = 0.05$

$$Z = -1.64$$

$$-1.64 = \frac{X - 22}{8}$$

$$X = -1.64(8) + 22 = 8.88 \text{ minutes}$$

3. $\mu = 40000$, $\sigma = 5000$

(a) $P(X > 42000)$

$$P\left(Z > \frac{42000 - 40000}{5000}\right)$$

$$P(Z > 0.4) = 0.3446 = 34.46\%$$

(b) $P(32000 < X < 42000)$

$$P\left(\frac{32000 - 40000}{5000} < Z < \frac{42000 - 40000}{5000}\right)$$

$$= P(-1.6 < Z < 0.4) = P(Z < 0.4) - P(Z < -1.6)$$

$$= 0.6554 - 0.0548$$

$$= 0.6006 = 60.06\%$$

(c) $P(32000 < X < 35000)$

$$P\left(\frac{32000 - 40000}{5000} < Z < \frac{35000 - 40000}{5000}\right)$$

$$P(-1.6 < Z < -1) = P(Z < -1) - P(Z < -1.6)$$

$$= 0.1587 - 0.0548$$

$$= 0.1039 = 10.39\%$$

(d) $P(Z > k) = 0.2$

$$P(Z < k) = 1 - 0.2 = 0.8$$

$$Z = 0.84$$

$$0.84 = \frac{X - 40000}{5000}$$

$$X = 0.84(5000) + 40000$$

$$= \$44200$$