Math 423 – Prof. Richard B. Goldstein – Walpole – 8th ed – Chapter 6 Answers

6.4 (a) $z = (17 - 30)/6 = -2.17$. Area$=1 - 0.0150 = 0.9850$.

(b) $z = (22 - 30)/6 = -1.33$. Area$=0.0918$.

(c) $z_1 = (32-3)/6 = 0.33$, $z_2 = (41-30)/6 = 1.83$. Area $= 0.9664-0.6293 = 0.3371$.

(d) $z = 0.84$. Therefore, $x = 30 + (6)(0.84) = 35.04$.

(e) $z_1 = -1.15$, $z_2 = 1.15$. Therefore, $x_1 = 30 + (6)(-1.15) = 23.1$ and $x_2 = 30 + (6)(1.15) = 36.9$.

6.8 (a) $z = (31.7 - 30)/2 = 0.85$; $P(X > 31.7) = P(Z > 0.85) = 0.1977$.
Therefore, 19.77% of the loaves are longer than 31.7 centimeters.

(b) $z_1 = (29.3 - 30)/2 = -0.35$, $z_2 = (33.5 - 30)/2 = 1.75$;
$P(29.3 < X < 33.5) = P(-0.35 < Z < 1.75) = 0.9599 - 0.3632 = 0.5967$.
Therefore, 59.67% of the loaves are between 29.3 and 33.5 centimeters in length.

(c) $z = (25.5 - 30)/2 = -2.25$; $P(X < 25.5) = P(Z < -2.25) = 0.0122$.
Therefore, 1.22% of the loaves are shorter than 25.5 centimeters in length.

6.26 $\mu = np = (100)(0.1) = 10$ and $\sigma = \sqrt{(100)(0.1)(0.9)} = 3$.

(a) $z = (13.5 - 10)/3 = 1.17$; $P(X > 13.5) = P(Z > 1.17) = 0.1210$.

(b) $z = (7.5 - 10)/3 = -0.83$; $P(X < 7.5) = P(Z < -0.83) = 0.2033$.

6.34 $\mu = (180)(1/6) = 30$ and $\sigma = \sqrt{(180)(1/6)(5/6)} = 5$.

(a) $z = (24.5 - 30)/5 = -1.1$; $P(X > 24.5) = P(Z > -1.1) = 1 - 0.1357 = 0.8643$.

(b) $z_1 = (32.5 - 30)/5 = 0.5$ and $z_2 = (41.5 - 30)/5 = 2.3$.
$P(32.5 < X < 41.5) = P(0.5 < Z < 2.3) = 0.9893 - 0.6915 = 0.2978$.

(c) $z_1 = (29.5 - 30)/5 = -0.1$ and $z_2 = (30.5 - 30)/5 = 0.1$.
$P(29.5 < X < 30.5) = P(-0.1 < Z < 0.1) = 0.5398 - 0.4602 = 0.0796$.

6.40 $P(X > 9) = \frac{1}{9}\int_9^\infty x^{-x/3}\,dx = \left[-\frac{x}{3}e^{-x/3} - e^{-x/3}\right]\Big|_9^\infty = 4e^{-3} = 0.1992$.

6.45 $P(X < 3) = \frac{1}{4}\int_0^3 e^{-x/4}\,dx = -e^{-x/4}\Big|_0^3 = 1 - e^{-3/4} = 0.5276$.
Let Y be the number of days a person is served in less than 3 minutes. Then
$P(Y \geq 4) = \sum_{x=4}^{6} b(y; 6, 1 - e^{-3/4}) = \binom{6}{4}(0.5276)^4(0.4724)^2 + \binom{6}{5}(0.5276)^5(0.4724)$
$+ \binom{6}{6}(0.5276)^6 = 0.3968$.