# Stat 451 Homework #7

5.52 From the negative binomial distribution, we obtain

$$b^*(8; 2, 1/6) = \binom{7}{1}(1/6)^2(5/6)^6 = 0.0651.$$

5.58 (a) Using the Poisson distribution with $x = 5$ and $\mu = 3$, we find from Table A.2 that

$$p(5; 3) = \sum_{x=0}^{5} p(x; 3) - \sum_{x=0}^{4} p(x; 3) = 0.1008.$$

(b) $P(X < 3) = P(X \leq 2) = 0.4232.$

(c) $P(X \geq 2) = 1 - P(X \leq 1) = 0.8009.$

5.76 (a) $P(X \leq 1|\lambda t = 2) = 0.4060.$

(b) $\mu = \lambda t = (2)(5) = 10$ and $P(X \leq 4|\lambda t = 10) = 0.0293.$

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 $x_2 = 30 + (6)(1.15) = 36.9$.

6.10 (a) $z = (10.075 - 10.000)/0.03 = 2.5$; $P(X > 10.075) = P(Z > 2.5) = 0.0062$. Therefore, 0.62% of the rings have inside diameters exceeding 10.075 cm.

(b) $z_1 = (9.97 - 10)/0.03 = -1.0$, $z_2 = (10.03 - 10)/0.03 = 1.0$;
$P(9.97 < X < 10.03) = P(-1.0 < Z < 1.0) = 0.8413 - 0.1587 = 0.6826$.

(c) $z = -1.04$, $x = 10 + (0.03)(-1.04) = 9.969$ cm.

6.12 $\mu = 99.61$ and $\sigma = 0.08$.

(a) $P(99.5 < X < 99.7) = P(-1.375 < Z < 1.125) = 0.8697 - 0.08455 = 0.7852$.

(b) $P(Z > 1.645) = 0.05$; $x = (1.645)(0.08) + 99.61 = 99.74$.

6.22 (a) $P(X > 7) = \frac{10-7}{10} = 0.3$.

(b) $P(2 < X < 7) = \frac{7-2}{10} = 0.5$.