

Stat 345 Solutions - Section 4.7

Problem 4-61

$$(a) P(X \leq 70) = P(Z \leq \frac{70-80}{\sqrt{48}}) = P(Z \leq -1.44) = 0.0749$$

$$(b) P(70 < X < 90) = P(\frac{70-80}{\sqrt{48}} < Z < \frac{90-80}{\sqrt{48}}) = P(-1.44 < Z < 1.44) = P(Z < 1.44) - P(Z < -1.44) = 0.9251 - 0.0749 = 0.8502$$

Problem 4-63

$X \sim \text{binomial}(n = 1000, p = .02)$

$$(a) P(X > 25) = P(\frac{X-1000(.02)}{\sqrt{1000(.02)(.98)}} > \frac{25-1000(.02)}{\sqrt{1000(.02)(.98)}}) \doteq P(Z > 1.13) = 0.129238$$

$$(b) P(20 < X < 30) = P(\frac{20-1000(.02)}{\sqrt{1000(.02)(.98)}} < \frac{X-1000(.02)}{\sqrt{1000(.02)(.98)}} < \frac{30-1000(.02)}{\sqrt{1000(.02)(.98)}}) \doteq P(0 < Z < 2.26) = .988089 - .5 = .488089$$

Problem 4-66

X equals the number of particles in 10 square centimeters of dust. X follows a Poisson distribution with $\lambda = (1000)(10) = 10000$.

$$P(X > 10000) = 1 - P(X \leq 10000) = 1 - P(Z \leq \frac{10000-10000}{\sqrt{10000}}) = 1 - P(Z \leq 0) = 1 - 0.5 = 0.5$$