Problem 4-61

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

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

Problem 4-63

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

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

(b) \( P(20 < X < 30) = P\left(\frac{20-1000(.02)}{1000(.02)(.98)} < \frac{X-1000(.02)}{1000(.02)(.98)} < \frac{30-1000(.02)}{1000(.02)(.98)}\right) = P(0 < Z < 2.26) = .98809 - .5 = .488089 \)

Problem 4-66

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

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