2-74 A: Batch formed from 2 different lots
(6) B: " requires additional processing

Given $P(A) = .03$ $P(B|A') = .05$ $P(B|A) = .4$

(a) $P(A) = 0.03$ (b) $P(A') = 0.97$ (c) $P(B|A) = 0.4$
(d) $P(B|A') = 0.05$ (e) $P(A \cap B) = P(B|A)P(A) = 0.012$
(f) $P(A \cap B') = P(B'|A)P(A) = \{1 - P(B|A)\}P(A) = 0.018$
(g) $P(B) = P(B|A)P(A) + P(B|A')P(A')$
$= (0.4)(.03) + (.05)(.97) = 0.0605$

3-106 Let X_t = NO. FAILURES IN $(0, t]$ $X_t \sim \text{Pois}(0.02t)$
(8)
(a) $P(X_8 = 0) = e^{-(.02)(8)} = 0.8521$

(b) $P(X_{24} > 1) = 1 - e^{-(.02)(24)} = 0.3812$

3-114 Let X = no. who recover in 1 week.
(6) If drug has no effect, distrib of X is same as for untreated, so $X \sim \text{Bin}(20, .1)$
$P(X \geq 4 \mid \text{Drug has no effect}) = \sum_4^{20} \binom{20}{x}(.1)^x(.9)^{20-x}$

$= 1 - \sum_0^3 \binom{20}{x} (.1)^x (.9)^{20-x}$
$= 1 - \{(.9)^{20} + 20(.1)(.9)^{19} + 190(.1)^2(.9)^{18} + 1140(.1)^3(.9)^{17}\}$
$= 0.1330$

4-152 (a) $(\Phi(-6) + (1 - \Phi(6))) \times 10^6 = 0.001973$
(8) (b) $(\Phi(-7.5) + (1 - \Phi(4.5)) \times 10^6 = 3.398$
(c) $(\Phi(-3) + (1 - \Phi(3)) \times 10^6 = 2700$
(d) $(\Phi(-4.5) + (1 - \Phi(1.5)) \times 10^6 = 66811$

5-52 (8) Let T be time to problem in a given line

(a) P(No line experiences a problem in 40 hours)

$= P(T>40)^3 = \{1-(1-e^{-\frac{1}{40}40})\}^3 = (e^{-1})^3 = e^{-3} = 0.0498$

(b) P(All 3 lines experience a problem between 20 and 40 hrs)

$= P(T<20)^3 = \{1-e^{-\frac{1}{40}20}\}^3 = (1-e^{-.5})^3 = 0.0609$

(c) lines are independent.

7-49 Using (7-7) and (7-8)

(3) All data normal

$\mu_{\bar{X}_1-\bar{X}_2} = \mu_1 - \mu_2 = 100 - 105 = -5$

$\sigma^2_{\bar{X}_1-\bar{X}_2} = \frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2} = \frac{1.5^2}{25} + \frac{2.0^2}{30} = 0.223\dot{3}$

$\Rightarrow \bar{X}_1 - \bar{X}_2 \sim N(-5, 0.223\dot{3})$

7-50

(1) $SE(\bar{X}_1 - \bar{X}_2) = \sigma_{\bar{X}_1-\bar{X}_2} = \sqrt{0.223\dot{3}} = 0.4726$