1. let GH={Kizzie has gone home}
HC={Kizzie is in Holder courtyard}
IW={Kizzie went to Institute Woods}
F={Kizzle is found}

then: P(F)=P(GH)P(F—GH)+P(HC)P(F—HC)+P(IW)P(F—IW)=.2*1+.6*.95+.2*.5=.87

a) $P((F \cap HC) \cup (F \cap IW)) = .57 + .10 = .67$

b) $P(L) = 1 - P(F) = 1 - .87 = .13$

c) $P(HC|F) = \frac{P(HC \cap F)}{P(F)} = \frac{.57}{.87} = .66$

2. Possion λ=4 seeds in $100ft^2 \implies \alpha = .04$seeds/ft^2

a) $\lambda = 50 * .04 = 2$
$P(X > 2) = 1 - P(X \leq 2)$
$= 1 - (P(x = 0) + P(x = 1) + P(x = 2))$
$= 1 - \frac{e^{-2}2^0}{0!} - \frac{e^{-2}2^1}{1!} - \frac{e^{-2}2^1}{2!}$
$= 1 - 5e^{-1} = .324$

b) $E(X) = E(\sum_{i=1}^{5} X_i) = 5 * (25 * .04) = 5$

c) Let $Y_i = \begin{cases} 1 & \text{if } X_i > 0 \\ 0 & \text{if } X_i = 0 \end{cases}$
then $p = P(Y_i = 1) = P(X_i > 0) = 1 - P(X_i = 0) = 1 - \frac{e^{-1}1^0}{0!} = 1 - e^{-1} = .632$

Let $Y = \sum_{i=1}^{5} Y_i$, then Y is binomial with $n = 5, p = .632$.
$P(Y = 4) = \begin{pmatrix} 5 \\ 4 \end{pmatrix} p^4(1-p)^1 = 5(.632)^4(.368)^1 = .29$

3. a) 0. The r.v. is continuous distributed, so for any $x, P(X = x) = 0$.

b) $Z = \frac{100-90}{8} = 1.25$
$\Longrightarrow \Phi(Z) = 0.8944$

c) $\Phi(Z) = .98 \Longrightarrow Z = 2.06.$
$x = 90,000 - 2.06 * 8,000 = 73,500$ miles.

d) Prob$= 1 - P($none of $X < x) = 1 - P(X_1 < x \cap X_2 < x \cap X_3 < x \cap X_4 < x)$
$= 1 - (1-p)^4$(by independent of Xs) $= 1 - (.98)^4 = .08$

e) $n = 1000, p = .02$
$(Prob) = 1 - P(Y \leq 15)$
and $P(Y = y) = \begin{pmatrix} 100 \\ y \end{pmatrix} p^y (1-p)^{1000-y}$
since $np = 20,$ we can approximate $P(Y \leq 15)$ by
$\Phi(\frac{15+.5-20}{\sqrt{20(.98)}}) = \Phi(-1).$
so, Prob $= 1 - \Phi(-1) = \Phi(1) = .84$