

Q10. (Assignment 3)

Let X = the number of diodes on a board that fail.

$$X \sim \text{Binomial}(n=200, p=0.01)$$

$$a) \quad EX = np = (200)(0.01) = 2$$

$$V(X) = np(1-p) = (200)(0.01)(0.99) = 1.98$$

$$\sigma = \sqrt{V(X)} = 1.407$$

b). X has approximately a Poisson distr. with $\lambda = np = 2$

$$P(X \geq 5) = 1 - P(X \leq 4)$$

$$= 1 - F(4; 2) \quad (\text{look up table A2})$$

$$= 1 - 0.947 = 0.053$$

c). $P(\text{board works properly}) = P(\text{all diodes work})$

$$= P(X=0) = \frac{e^{-2} 2^0}{0!} = 0.135$$

Let Y = the number among the five boards that work.

$$Y \sim \text{Binomial}(n=5, p=0.135)$$

$$P(Y \geq 4) = P(Y=4) + P(Y=5)$$

$$= \binom{5}{4} (0.135)^4 (0.865)^1 + \binom{5}{5} (0.135)^5 (0.865)^0$$

$$= 0.00148$$