MEI STATISTICS 2 JUNE 2010 Q2 POISSON

2i) Counts have a uniform mean rate of occurrence

Counts are independent of each other

---

ii) Variance = 3.4

iii) $X \sim \text{Poisson}(3.4)$

A) $P(X=3) = e^{-3.4} \times \frac{3.4^3}{3!} = 0.2186$

B) $P(X \geq 3) = 1 - P(X \leq 2)$

$= 1 - 0.3397$

$= 0.6603$

---

iv) $X \sim \text{Poisson}(3.4 \times 12)$

$X \sim \text{Poisson}(40.8)$ $\quad P(X=40) = e^{-40.8} \times \frac{40.8^{40}}{40!}$

$= 0.0625$

---

v) Approximate with $X \sim N(\underset{\mu}{40.8}, \underset{\sigma^2}{\sqrt{40.8}^2})$

Find $P(X > 39.5)$

$$z = \frac{x - \mu}{\sigma}$$

$$z = \frac{39.5 - 40.8}{\sqrt{40.8}}$$

$$z = -0.2035$$

$P(Z > -0.2035) = P(z < 0.2035) = 0.581$

MEI STATISTICS 2 JUNE 2010 Q2 POISSON

2vi) $X \sim \text{Poisson}(3.4)$ $Y \sim \text{Poisson}(1.4)$

$X+Y \sim \text{Poisson}(4.8)$

$P((X+Y) \geq 8) = 1 - P((X+Y) \leq 7)$

$= 1 - 0.8867$ (tables)

$= 0.1133$