

2 i) $X \sim B(10, 0.02)$

$$P(X=1) = {}^{10}C_1 \times 0.02^1 \times 0.98^9 = 0.1667$$

ii) n is large, p is small

iii) $X \sim B(150, 0.02)$ $np = 150 \times 0.02 = 3$

Approximate with $X \sim \text{Poisson}(3)$

A) $P(X=0) = e^{-3} = 0.0498$

B) $E(X) = 3$ $P(X > 3) = 1 - P(X \leq 3)$
 $= 1 - 0.6472$ (Tables)
 $= 0.3528$

iv) $X \sim B(2000, 0.02)$ $np = 40$ $npq = 40 \times 0.98 = 39.2$

A)

Approximate with

$$X \sim N\left(40, \sqrt{39.2}^2\right)$$

B) Find $P(X < 50.5)$

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

$$Z = \frac{50.5 - 40}{\sqrt{39.2}}$$

$$Z = 1.677$$

$$P(Z < 1.677) = 0.9532$$
