

MATH 1550 Quiz 6

#23 in Section 4.3

Soln: Binomial distribution $\rightarrow n=5$

$$p=0.54$$

$$q=1-p=0.46$$

$$\left\{ \begin{array}{l} P(x) = \frac{5!}{(5-x)!x!} (0.54)^x (0.46)^{5-x} \\ x=0,1,2,3,4,5 \end{array} \right.$$

$$a) P(x=3) = \frac{5!}{(5-3)!3!} (0.54)^3 (0.46)^{5-3}$$

$$= \frac{5!}{2!3!} (0.54)^3 (0.46)^2$$

$$= 0.3331$$

$$b) P(x < 4) = P(x=0) + P(x=1) + P(x=2) + P(x=3)$$

$$= \frac{5!}{5!0!} (0.54)^0 (0.46)^5 + \frac{5!}{4!1!} (0.54)^1 (0.46)^4 + \frac{5!}{3!2!} (0.54)^2 (0.46)^3$$

$$+ \frac{5!}{3!2!} (0.54)^3 (0.46)^2$$

$$= 0.7585$$

Note: can also
compute as

$$P(x < 4) = 1 - P(x \geq 4)$$

$$= 1 - (P(4) + P(5))$$

$$c) P(x \text{ at least } 3) = P(x \geq 3) = P(x=3) + P(x=4) + P(x=5)$$

$$= \frac{5!}{2!3!} (0.54)^3 (0.46)^2 + \frac{5!}{3!4!} (0.54)^4 (0.46)^1 + \frac{5!}{0!5!} (0.54)^5 (1)$$

$$= 0.5746$$