AP Statistics – Binomial Models Practice   Name: _____ Per: _00_

1. A die is weighted so that the probability of rolling a "6" is 0.48. The die is rolled 18 times.

a) Find the probability that the die lands on a "6" <u>exactly</u> <u>11</u> times.   ☆ Binomial probability

$$P(x=11) = \binom{18}{11}(0.48)^{11}(0.52)^{7}$$

$$= \boxed{0.1020}$$

↳ ① Show "work"

← ② Use "BinomPDF$(18, 0.48, 11)$"

p = 0.48   n = 18

X = # of die rolls that land "6"

b) Find the probability that the die lands on a "6" either <u>7 or 8</u> times.

$$P(x=7 \text{ or } 8) = P(x=7) + P(x=8)$$

$$= \binom{18}{7}(0.48)^{7}(0.52)^{11} + \binom{18}{8}(0.48)^{8}(0.52)^{10}$$

$$= 0.14044 + 0.17825 = \boxed{0.3187}$$

c) Find the probability that the die lands on a "6" <u>no more than</u> 5 times *(this means 5 times or fewer)*.

$$P(x \le 5) = P(x=0) + P(x=1) + P(x=2) + \cdots + P(x=5)$$

$$= \binom{18}{0}(0.48)^{0}(0.52)^{18} + \binom{18}{1}(0.48)^{1}(0.52)^{17} + \ldots + \binom{18}{5}(0.48)^{5}(0.52)^{13}$$

$$= \boxed{0.0676}$$

Again... ① Show "work"

② Use "BinomCDF$(18, 0.48, 5)$"

d) Find the probability that the die lands on a "6" <u>at least</u> 4 times.

$$P(x \ge 4) = P(x=4) + P(x=5) + \cdots + P(x=18)$$ ← UGH!!!

$$= 1 - [P(x \le 3)]$$

$$= 1 - \left[\binom{18}{0}(0.48)^{0}(0.52)^{18} + \ldots + \binom{18}{3}(0.48)^{3}(0.52)^{15}\right]$$

$$= 1 - [\underset{\text{BinomCDF}(18, 0.48, 3)}{0.0061}] \approx \boxed{0.9939}$$