NAME SOLUTIONS

Assignment 4
201-BZS-05- Section 2
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Question 1 Flaws on a used computer tape occur on the average of one flaw per 1200 feet. If one assumes a Poisson distribution, what is the probability distribution function of the random variable x = # of flaws in a 4800 foot roll? What is the probability that the roll has fewer flaws than expected?

Question 2
A roll of a biased 6-sided die results in a two only 1/10 times. Let x denote the number of twos in 100 rolls of the die. Give the exact value and an approximate value of the following probabilities. Briefly justify why the method you chose to approximate is valid.
(a) $P(3 \leq x \leq 7)$
(b) $P(x \leq 5)$

① $\mu = 4 \cdot 1 = 4$ (because interval is multiplied by 4).

$$P(x < \mu) = P(x < 4)$$
$$= P(3) + P(2) + P(1) + P(0)$$
$$= \sum_{i=0}^{3} \frac{4^i e^{-4}}{i!} = \boxed{0.43}$$

② (a) $$P(3 \leq x \leq 7) = \sum_{i=3}^{7} (100 C_i)(0.1)^i (0.9)^{100-i}$$

$$P(3 \leq x \leq 7) \approx \sum_{i=3}^{7} \frac{10^i e^{-10}}{i!} = e^{-10}\left[\frac{10^3}{3!} + \frac{10^4}{4!} + \dots + \frac{10^7}{7!}\right]$$

$\mu = np$
$= 100 \cdot (0.1) = 10$

(b) $$P(x \leq 5) = \sum_{i=0}^{5} 100 C_i \, (0.1)^i (0.9)^{100-i}$$

$$P(x \leq 5) \approx \sum_{i=0}^{5} \frac{10^i e^{10}}{i!}$$

we can use Poisson because $n = 100$ large