2/12/2010
Dr. Lunsford

MA371 Intro. To Prob. & Stats.
Quiz 4

Name: Solution
(40 Points Total)

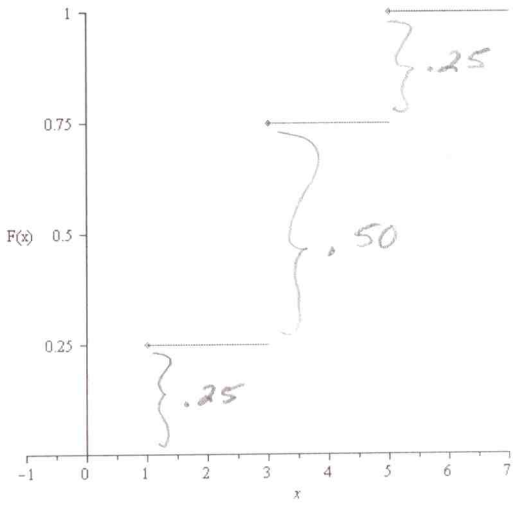
I. The discrete random variable X has probability mass function $f(x) = \frac{x}{55}$ for $x = 1, 2, \ldots, 10$. Please find the following being sure to show all intermediate steps. (3 points each, 6 total)

(a) $P(X > 8) = P(X=9) + P(X=10) = \frac{9}{55} + \frac{10}{55} = \frac{19}{55} \approx 0.3455$

(b) $P(X > 8 \mid X \geq 2) = \frac{P(X>8 \text{ and } X \geq 2)}{P(X \geq 2)} = \frac{P(X>8)}{1 - P(X \leq 1)}$

$= \frac{\frac{19}{55}}{1 - \frac{1}{55}} = \frac{19}{54} \approx 0.3519$ ← notice this is more likely than part (a)

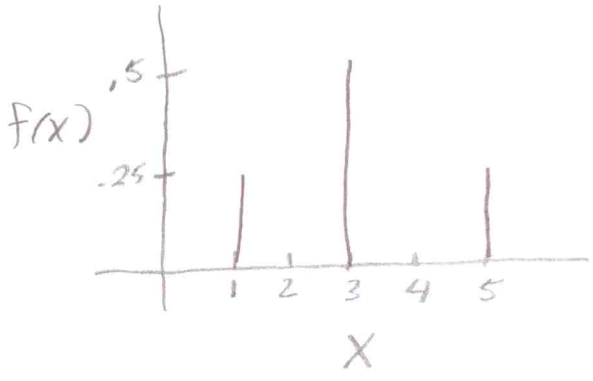
II. To your right you are given the graph of the *cumulative density function* for a discrete random variable X. Please use it to answer the following questions. (9 points total)



(a) Find $P(X \leq 2) = F(2) = 0.25$
(2 points)

(b) Find $P(X = 3) = 0.50$
(3 points) ↳ $P(X \leq 3) - P(X < 3)$
$= .75 - .25$

(c) Draw the graph of the probability mass function for this random variable. Please clearly label your axes. (4 points)



II. For each scenario below give the name of the distribution of the random variable, give all parameters of the distribution, and give the probability mass function of the distribution (including for which values of the random variable the distribution is defined). (5 points each, 10 total)

(a) A woman hits a target with probability 5/7. She shoots at the target 12 times. Let the random variable X be the number of misses in the 12 shots.

X is binomial with $n=12$, $p=\frac{2}{7}$

$$f(x)=\binom{12}{x}\left(\frac{2}{7}\right)^{x}\left(\frac{5}{7}\right)^{12-x}, \quad x=0,1,\ldots,12$$

(c) Dr. L's pantry has 6 cans of tuna cat food and 3 cans of liver cat food. Dr. L randomly selects 4 cans of cat food for her four tigers. Let the random variable X be the number cans of tuna cat food chosen.

X is geometric

$N_1=6$

$N_2=3$

$N=N_1+N_2=9$

$n=4$

$$f(x)=\frac{\binom{6}{x}\binom{3}{4-x}}{\binom{9}{4}}, \quad x=1,2,3,4$$