Name: _____

Directions: MAKE SURE TO COPY YOUR ANSWERS TO A SEPARATE SHEET FOR SENDING ME AN ELECTRONIC COPY LATER.

When a problem says "Find," do NOT use simulation.

1. Consider the coin and die game, Sec. 4.15.3.

(a) (15) Find $P(M = 2)$.

(b) (15) Find $Var(M)$.

(c) (15) Find $p_{M,W}(1, 1)$.

2. (15) Suppose some random variable X has a Poisson distribution with $\lambda = 3.2$. Do NOT use loops in this problem.

(a) (15) Find $P(X \leq 8)$.

(b) (15) Find $E(X^2)$. (You'll need a mailing tube, but need not cite it.)

3. Consider the parking space example, Sec. 4.2.2.

(a) (15) Change line 7 in the code so that instead of returning the approximate value of ED, it returns the approximate value of $P(D \leq 12)$.

(b) (10) (Not a continuation of part (a).) We have a caravan of four cars, and thus need four parking spaces. Let D denote the distance of the furthest car from the destination. Find $P(D = 12)$. Do NOT answer with a single R function call; instead, you must write an R expression that includes a call to **choose()**.

Solutions:

1.a $(5/6)(1/6)$

1.b M is geometric, so its variance is $(1-p)/p^2$, where $p = 1/6$.

1.c

$$p_{M,W}(1,1) = P(M=1, W=1) = P(M=1)P(W=1|M=1) = (1/6)(1/2)$$

2.a

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ppois(8,3.2)
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2.b

$$E(X^2) = Var(X) + (EX)^2 = 3.2 + 3.2^2$$

3.a

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mean(dvals <= 12)
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3.b Number the spaces 1,2,...,10 in the first block, 11,12,...,20 in the second block and so on. $D = 12$ means that the furthest car is in space 23. That in turn means that the fourth empty space was space 23. The probability of this is that of a negative binomial distribution with $r = 4$ and $p = 0.15$.