Honors Statistics: *4-2 Expected Value*

1. The probability model below describes the number of repair calls that an appliance repair shop may receive during the hour.

X=# repair calls	0	1	2	3
P(X)	0.1	0.3	0.4	0.2

   a. How many calls should the shop expect per hour?
   b. Find the standard deviation.

2. A commuter must pass through five traffic lights on her way to work, and will have to stop at each one that is red. She estimates the probability model for the number of lights she hits, as shown below.

X = # red lights	0	1	2	3	4	5
P(X)	0.05	0.25	0.35	0.15	0.15	0.05

   a. How many red lights should she expect to hit each day?
   b. Find the standard deviation.

3. A consumer organization inspecting new cars found that many had appearance defects (dents, scratches, paint chips, etc.). While none had more than three of these defects, 7% had three, 11% two, and 21% one defect.

   a. Create a probability model for the amount of defects on a new car.
   b. Find the expected number of appearance defects on a new car.
   c. Find the standard deviation.

4. The college student senate is sponsoring a spring break Carribbean cruise raffle. The proceeds are to be donated to the Samaratan Center. A local travel agency donated the cruise, valued at $2000. The students sold 2852 raffle tickets at $5 per ticket.

   a. Create a probability model for the amount of money you win.
   b. If a person buys one raffle ticket, what is the expected value?
   c. Find the standard deviation.

5. You play a game that costs $20 to play. You roll two dice. If the sum is 2, 3, or 12, you win $100. If the sum is 7 or 11, you win $50. If not, you win nothing.

   a. Create a probability model for the amount you win at this game.
   b. Find the expected value you'll win.
   c. Find the standard deviation.

6. An insurance policy costs $100, and will pay policyholders $10,000 if they suffer a major injury (resulting in hospitalization) or $3,000 if they suffer a minor injury (resulting in lost time from work). The company estimates that each year 1 in every 2,000 policyholders may have a major injury, and 1 in 500 a minor injury.

   a. Create a probability model for the **company's profit** on a policy.
   b. What is the company's expected profit on this policy?
   c. Create a probability model for the **consumer's profit** for the policy.
   d. What is the consumer's expected value?

ANSWERS: 4-2: Expected Value

1a 1.7
1b 0.9

2a. 2.3
2b. 1.3

3a

X = # defects	0	1	2	3
P(X)	0.61	0.21	0.11	0.07

3b. 0.6
3c. 0.9

4a.

X = Money won	$-5	$1995
P(X)	2851/ 2852	1/ 2852

4b $-4.30
4c. $37.40

5a.

X = Money won	$80	$30	$-20
P(X)	4 / 36	8 / 36	24/ 36

5b. $2.20
5c. $34.20

6a.

X = CompanyProfit	$100	$-9900	$-2900
P(X)	399 / 400	1 / 2000	1 / 500

6b. $89.00

6c.

X = Consumer Profit	$-100	$9900	$2900
P(X)	399 / 400	1 / 2000	1 / 500

6d. $-89.00