AP STATISTICS
Probability Worksheet (HW 5.2)

Please show all work and solutions on separate paper.

1. Find the expected value and the standard deviation of each random variable.

    a)

x	20	30	50
$P(X = x)$	0.3	0.5	0.2

    b)

x	3	5	7	9
$P(X = x)$	0.3	0.4	0.2	0.1

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 red lights she hits, as shown below.

X = # of red	0	1	2	3	4	5
$P(X = x)$	0.078	0.26	0.35	0.23	0.072	0.01

    a) How many red lights should she expect to hit each day?
    b) What's the standard deviation?

3. A couple plans to have children until they get a girl, but they agree that they will not have more than four children even if all are boys. (Assume boys and girls are equally likely)

    a) Create a probability model for the number of children they'll have.
    b) Find the expected number of children.
    c) Find the expected number of **boys** they'll have.
    d) Find the standard deviation of the number of *children* they will have.

4. An insurance policy costs $200 and will pay policyholders $10,000 if they suffer a major injury (resulting in hospitalization) or $3000 if they suffer a minor injury (resulting in lost time from work). The company estimates that each year 1 in every 5000 policyholders may have a major injury while 1 in 200 have a minor injury.

    a) Create a probability model for the profit on a policy.
    b) What's the company's expected profit on this policy?
    c) What's the standard deviation?

5. Given independent random variables with means and standard deviations as shown, find the mean and standard deviation of each of these variables:

    a) $X - 20$
    b) $0.5Y$
    c) $X + Y$
    d) $X - Y$
    e) $Y_1 + Y_2$

	Mean	SD
X	60	10
Y	16	6

6. The American Veterinary Association claims that the annual cost of medical care for dogs averages $90, with a standard deviation of $25, and for cats averages $140, with a standard deviation of $40.

    a) What's the expected difference in the cost of medical care for dogs and cats?
    b) What's the standard deviation of that difference?
    c) If the difference in cost can be described by a Normal model, what's the probability that medical expenses are higher for someone's dog than for her cat?

Selected answers (<u>MUST</u> show work for any credit!)

1 a) mean = 31   standard deviation = 10.440

3 b) 1.875   c) 0.9375

4 b) $183.00

5 a) mean = 40   standard deviation = 10
   c) mean = 76   standard deviation = 11.662