PROBABILITY HOMEWORK .

1. Suppose that a coin is flipped once. What is the probability of
   a. A Head
   b. A Tail

2. Suppose a coin is flipped several times.
   a. What is the probability of 2 tails in two flips?
   b. What is the probability of 3 heads in three flips?
   c. What is the probability of 4 heads in four flips?
   d. What is the probability of 8 Tails in eight flips?

3. Define a Bernoulli process.

4. What do the terms “success” and “failure” mean in a Bernoulli process?

5. If p = .75 in a Bernoulli process, what does q equal?

6. What does the term “Sample Space” mean? Give an example of a sample space with equiprobable outcomes.

7. A card is drawn at random from a standard deck of 52 cards. What is the probability of
   a. A Queen of Diamonds?
   b. An Ace?
   c. Not an Ace?
   d. A Diamond?
   e. A face card?

8. A standard deck is shuffled and a card is drawn. The card is noted and then replaced into the deck. The deck is re-shuffled and a second card is drawn. What is the probability of
   a. A deuce on the first draw and a 7 on the second?
   b. A deuce on the first draw and a red card on the second?
   c. A black card on the first and a black card on the second?
   d. A black card on the first and a red on the second?
   e. A face card on the first and a numbered (non-face) card on the second?
   f. An ace of hearts on the first and an ace of hearts on the second?
   g. A 3 on the first and a 9 on the second?

ANSWER KEY:

HW Probability

1a .5
b. .5

2a $p(TT) = p(T)p(T) = (.5)(.5) = .25$
b $p(HHH) = p(H)p(H)p(H) = (.5)(.5)(.5) = .125$
c $p(HHHH) = p(H)p(H)p(H)p(H) = (.5)(.5)(.5)(.5) = .0625$
d $p(TTTTTTTT) = (p(T))^8 = (.5)^8 = .0039$

3. A process that has only two possible outcomes

4 Success = p(head)
Failure = p(tail)

5 $q = 1 - p = 1 - .75 = .25$

6. Sample space = all possible outcomes. Six sides on a dice = 1/6

7. p(Queen Diamond) = 1/52
p(Ace) = 4/52 = 1/13
$p(\overline{Ace}) = 1 - p(Ace) = 1 - 1/13 = 12/13$
p(Diamond) = 13/52 = 1/4
p(Face card) = 12/52 = 3/13 Face card = J, Q, K

Face = J, Q, K
non-Face = all other

8. p(deuce) and p(seven) = $(1/13)(1/13) = 1/169$
b. p(deuce) and p(red) = $(1/13)(1/2) = 1/26$
c. p(black) and p(black) = $(1/2)(1/2) = 1/4$
d. p(black) and p(red) = $(1/2)(1/2) = 1/4$
e. p(face) and p(non-face) = $(12/52)(40/52) = 480/2704 = 120/676 = 60/338 = 30/$
f. p(ace H) and p(ace H) = $(1/52)(1/52) = 1/2704$ = .00037
g. p(3) and p(nine) = $(1/13)(1/13) = 1/169$

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6. Sample space: all possible outcomes. Six sides on a dice: 1/6

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p(Ace) = 4/52 = 1/13
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g. p(3) and p(nine) = (1/13)(1/13) = 1/169