Section 9-7   Function of a Random Variable

You take a 6 question multiple choice test that has answers A, B, C, D. (exactly one answer is correct)

    a.   What is the probability that your answer on a particular problem is correct?

    b.   What is the probability that your answer is wrong?

    c. If you guess at random what is the probability that you will get 2 answers correct?

Binomial Probability Distribution $\qquad P(x) = {}_nC_x \cdot a^{n-x} \cdot b^x$
       b is the probability that the event will occur in any one trial
       a is the probability that the event will NOT occur in any one trial
       x is the number of times the event occurs in "n" repetitions

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    d. Find all terms in the probability distribution.

$$P(0) = {}_6C_0 \cdot 0.75^6 \cdot 0.25^0$$
$$P(1) = {}_6C_1 \cdot 0.75^5 \cdot 0.25^1$$
$$P(2) = {}_6C_2 \cdot 0.75^4 \cdot 0.25^2$$
$$P(3) = {}_6C_3 \cdot 0.75^3 \cdot 0.25^3$$
$$P(4) = {}_6C_4 \cdot 0.75^2 \cdot 0.25^4$$
$$P(5) = {}_6C_5 \cdot 0.75^1 \cdot 0.25^5$$
$$P(6) = {}_6C_6 \cdot 0.75^0 \cdot 0.25^6$$

    e. Plot the graph of the probability distribution.

    f.   What is the probability you get at least 4 questions correct?

    g. What is the probability you get less than 4 questions correct?

Pascal's Triangle

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               1                    row 0
              1  1                  row 1
             1  2  1                row 2
           1  3  3  1               row 3
          1  4  6  4  1             row 4
        1  5 10 10  5  1            row 5
       1 6 15 20 15  6  1           row 6
     1 7 21 35 35 21 7  1 row 7
```

Binomial Expansion

$$(a + b)^0 = \qquad\qquad 1$$
$$(a + b)^1 = \qquad\qquad a + b$$
$$(a + b)^2 = \qquad\qquad a^2 + 2ab + b^2$$
$$(a + b)^3 = \qquad\qquad a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a + b)^4 = \qquad\qquad a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$
$$(a + b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$$

Extra Example:
The probability of Carter scoring a free-throw is 85%. He has 8 attempts.

    a.   Find the probability of Carter scoring 5 free-throws.

    b.   Find the probability of Carter scoring at least 6 free-throws.

    c.   Find the probability he scores less than 4 free-throws.