US5256 LESSON FOUR: BINOMIAL THEOREM

1. For the following equations, use the expression $x^2 + x + 2 - 2a = 0$ and the calculator equation function to solve for x:

   a. $e^x = 1.3$ b. $e^x = 0.8$ c. $e^{2x} = -0.6$ d. $e^{-3x} = 1.5$ e. $e^{2+x} = -0.72$

2. a. Write out Pascal's Triangle to twelve rows.

   b. Use the triangle to find ${}^{10}C_4$, ${}^{3}C_2$, ${}^{11}C_5$, ${}^{9}C_7$, ${}^{12}C_3$, ${}^{12}C_{10}$, and ${}^{5}C_2$. Compare your numbers with the calculator terms.

3. For addition of combinations, ${}^{n}C_r + {}^{n}C_{r+1} = {}^{n+1}C_r$. Use this to calculate

   a. ${}^{5}C_4 + {}^{5}C_5$ b. ${}^{17}C_{10} + {}^{17}C_9$ c. ${}^{3}C_2 + {}^{4}C_3$ d. ${}^{13}C_8 - {}^{12}C_8$

4. Use Pascal's Triangle to expand

   a. $(x + y)^4$

   b. $(x - y)^6$

   c. $(d + e)^9$

   d. $(d - e)^3$

5. Use the Binomial Theorem to expand

   a. $(x + 3)^3$

   b. $(2 - x)^8$

   c. $(3x + 2)^4$

   d. $(7 - 2x)^5$

   e. $(x^2 + 5)^4$

6. Use the Binomial Theorem to determine the stated terms for each of the following expansions:

   a. $(2x + 3)^6$ The third term

   b. $(x - 5)^5$ The fourth term

   c. $(7 - 3x)^9$ The fifth term

   d. $(3 + 4x^2)^7$ The sixth term

7. Write down the first three terms of each of these expansions:

   a. $(x - 5)^{12}$

   b. $(3x - 5)^{10}$

   c. $(2 + 3x^2)^8$