Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Verify that the values of the variables listed are solutions of the system of equations.

1)
$$\begin{cases} 4x + y = -1 \\ 3x + 4y = 9 \end{cases}$$
x = -1, y = 3

    A) not a solution   B) solution

Solve the system of equations by using substitution.

2)
$$\begin{cases} x + 6y = 6 \\ 7x - 8y = -8 \end{cases}$$
    A) x = 1, y = 1   B) x = 0, y = 0
    C) x = 0, y = 1   D) x = 1, y = 0

Use the elimination method to solve the system.

3)
$$\begin{cases} x + y = -9 \\ x - y = 12 \end{cases}$$
    A) x = 9, y = -10.5
    B) x = 1.5, y = -10.5
    C) x = 9, y = 1.5
    D) x = 1.5, y = 10.5

Solve the problem.

4) The Family Fine Arts Center charges $21 per adult and $11 per senior citizen for its performances. On a recent weekend evening when 495 people paid admission, the total receipts were $6805. How many who paid were senior citizens?

    A) 136 senior citizens
    B) 269 senior citizens
    C) 359 senior citizens
    D) 226 senior citizens

5) A retired couple has $150,000 to invest to obtain annual income. They want some of it invested in safe Certificates of Deposit yielding 7%. The rest they want to invest in AA bonds yielding 12% per year. How much should they invest in each to realize exactly $15,500 per year?

    A) $100,000 at 12% and $50,000 at 7%
    B) $110,000 at 12% and $40,000 at 7%
    C) $90,000 at 7% and $60,000 at 12%
    D) $100,000 at 7% and $50,000 at 12%

Solve the system.

6)
$$\begin{cases} 4x - 2y = 7 \\ 4x - 2y = 9 \end{cases}$$
    A) inconsistent (no solution)
    B) consistent (many solutions)
    C) $\left(\dfrac{7}{2}, \dfrac{9}{4} \right)$
    D) (7, 9)

Solve the system of equations.

7)
$$\begin{cases} x + y + z = -4 \\ x - y + 2z = -9 \\ 4x + y + z = -19 \end{cases}$$
    A) inconsistent (no solution)
    B) x = -1, y = -5, z = 2
    C) x = -5, y = 2, z = -1
    D) x = -1, y = 2, z = -5

8)
$$\begin{cases} x + y + z = 1 \\ x - y + 5z = -21 \\ 4x + 4y + 4z = 7 \end{cases}$$
    A) x = -4, y = 2, z = 3
    B) x = -4, y = 3, z = 2
    C) x = 2, y = 3, z = -4
    D) inconsistent (no solution)

9) $\begin{cases} x + 4y - z = 3 \\ x + 5y - 2z = 5 \\ 3x + 12y - 3z = 9 \end{cases}$

A) $x = 3z + 5$
$y = z - 2$
z = any real number

B) $x = z - 2$
$y = -3z - 5$
z = any real number

C) $x = -3z - 5$
$y = z + 2$
z = any real number

D) inconsistent (no solution)

Write the augmented matrix for the system.

10) $\begin{cases} 3x + 8y + 3z = 35 \\ 6x + 9y + 8z = 73 \\ 4x + 7y - 2z = 13 \end{cases}$

A) $\begin{bmatrix} 35 & 3 & 8 & | & 3 \\ 73 & 8 & 9 & | & 6 \\ 13 & -2 & 7 & | & 4 \end{bmatrix}$

B) $\begin{bmatrix} 3 & 8 & 3 & | & 35 \\ 6 & 9 & 8 & | & 73 \\ 4 & 7 & -2 & | & 13 \end{bmatrix}$

C) $\begin{bmatrix} 3 & 6 & 4 & | & 35 \\ 8 & 9 & 7 & | & 73 \\ 3 & 8 & -2 & | & 13 \end{bmatrix}$

D) $\begin{bmatrix} 3 & 8 & | & 3 \\ 6 & 9 & | & 8 \\ 4 & 7 & | & -2 \end{bmatrix}$

Write the system of equations associated with the augmented matrix. Do not solve.

11) $\begin{bmatrix} 1 & 0 & 0 & | & 5 \\ 0 & 1 & 0 & | & 7 \\ 0 & 0 & 1 & | & 5 \end{bmatrix}$

A) $\begin{cases} x = 5 \\ y = 7 \\ z = 5 \end{cases}$

B) $\begin{cases} x = -5 \\ y = -7 \\ z = -5 \end{cases}$

C) $\begin{cases} x = 0 \\ y = 2 \\ z = 0 \end{cases}$

D) $\begin{cases} x = 0 \\ y = 12 \\ z = 10 \end{cases}$

12) $\begin{bmatrix} 7 & 9 & 7 & | & -2 \\ 9 & 0 & 9 & | & 4 \\ 3 & 4 & 0 & | & 2 \end{bmatrix}$

A) $\begin{cases} 7x - 9y + 7z = -2 \\ 9x \quad\quad + 9z = -4 \\ 3x + 4y \quad\quad = -2 \end{cases}$

B) $\begin{cases} 7x + 9y + 7z = -2 \\ 9x \quad\quad + 9z = 4 \\ 3x \quad\quad + 4z = 2 \end{cases}$

C) $\begin{cases} 7x + 9y + 7z = -2 \\ 9x \quad\quad + 9z = 4 \\ 3x + 4y \quad\quad = 2 \end{cases}$

Solve each system of equations using matrices (row operations). If the system has no solution, say that it is inconsistent.

13) $\begin{cases} 2x + 3y = 0 \\ 4x + 8y = 4 \end{cases}$

A) $x = -3, y = -2$ B) $x = 2, y = -3$

C) $x = -3, y = 2$ D) Inconsistent

14) $\begin{cases} 3x - y + 9z = 36 \\ -8x + 6z = -44 \\ 2y + z = 8 \end{cases}$

A) $x = 7, y = 2, z = 3$

B) $x = 7, y = 3, z = 2$

C) $x = -7, y = 3, z = 14$

D) Inconsistent

Perform the indicated operation, whenever possible.

15) Let $A = \begin{bmatrix} 7 & -4 & 8 \\ -6 & 5 & -1 \\ 0 & 6 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & -6 & -1 \\ -7 & -4 & 3 \\ -3 & -9 & -5 \end{bmatrix}$. Find $A - B$.

A) $\begin{bmatrix} 9 & 2 & 9 \\ 1 & 9 & 2 \\ 3 & 15 & -4 \end{bmatrix}$

B) $\begin{bmatrix} 9 & 2 & 9 \\ 1 & 9 & -4 \\ 3 & 15 & 2 \end{bmatrix}$

C) $\begin{bmatrix} 5 & -10 & 7 \\ -13 & 1 & -8 \\ -3 & -3 & 2 \end{bmatrix}$

D) $\begin{bmatrix} 5 & -10 & 7 \\ -13 & 1 & 2 \\ -3 & -3 & -8 \end{bmatrix}$
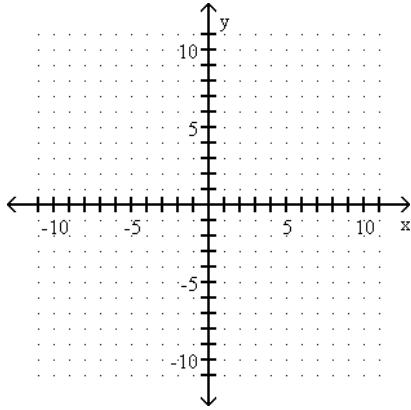
Perform the matrix multiplication.

16) Let $A = \begin{bmatrix} 0 & -3 & 1 \\ 5 & -1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & 1 \\ 1 & -1 \end{bmatrix}$. Find AB.
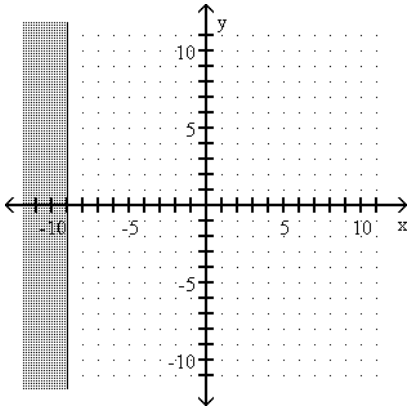
A) $\begin{bmatrix} 1 & 5 \\ -4 & 9 \end{bmatrix}$

B) $\begin{bmatrix} 1 & -4 \\ 5 & 9 \end{bmatrix}$

C) $\begin{bmatrix} 10 & -5 & 1 \\ 5 & -1 & 0 \\ -5 & -2 & 0 \end{bmatrix}$

D) $\begin{bmatrix} 0 & 10 \\ 0 & -1 \\ 0 & 0 \end{bmatrix}$
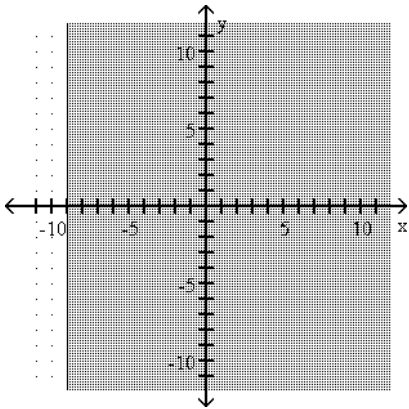
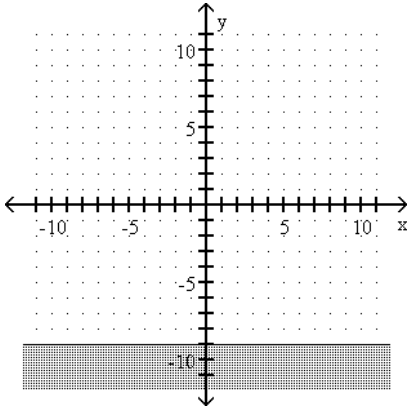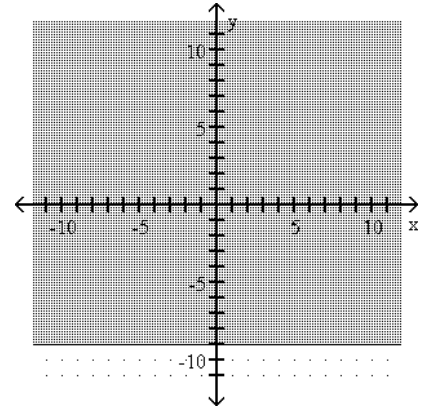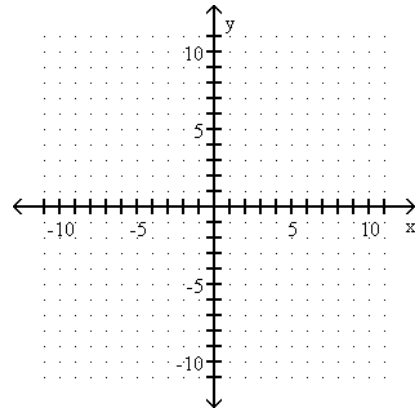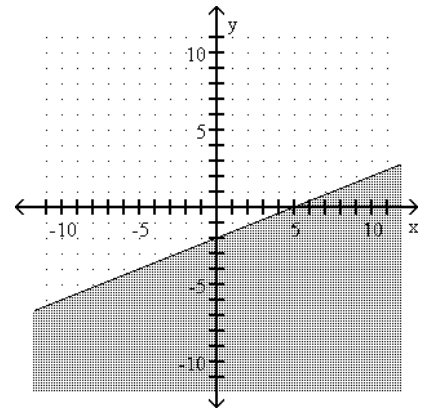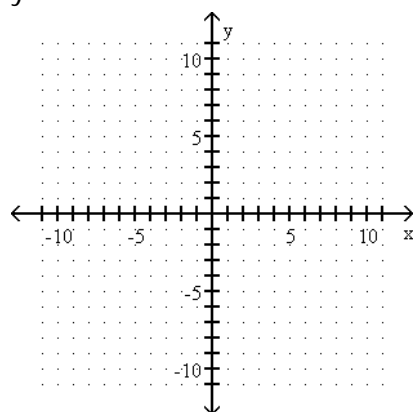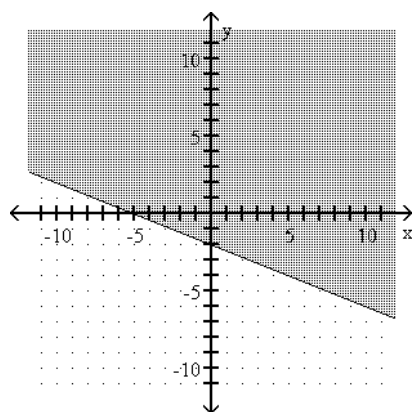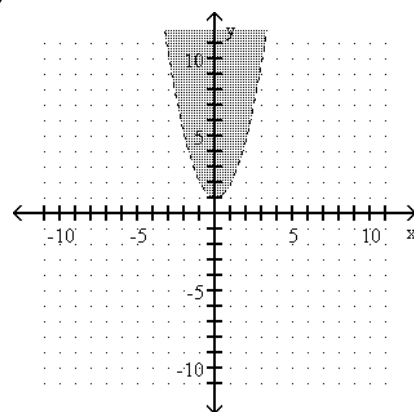Graph the inequality.

17) $y \leq -9$

D)

18) $-2x - 5y \leq 10$

A)

B)

A)

C)

3

B)
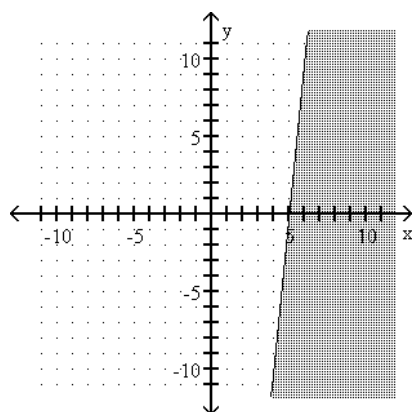
19) $y > x^2 + 1$

C)

A)

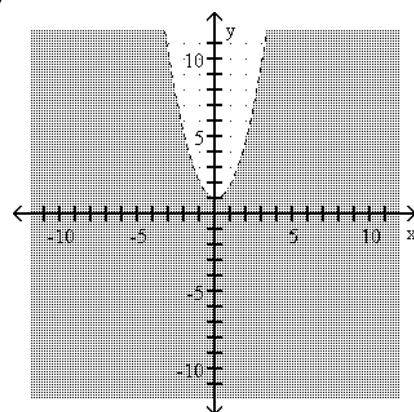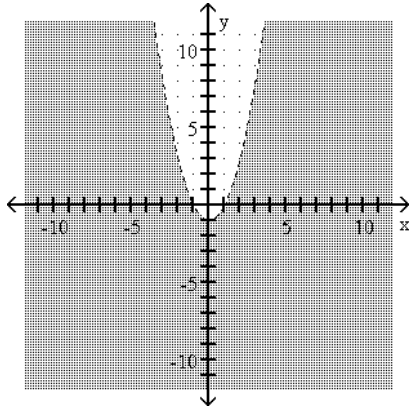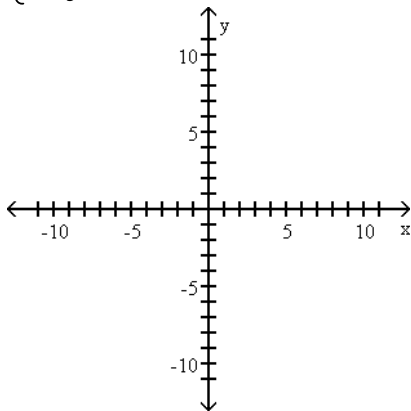

D)
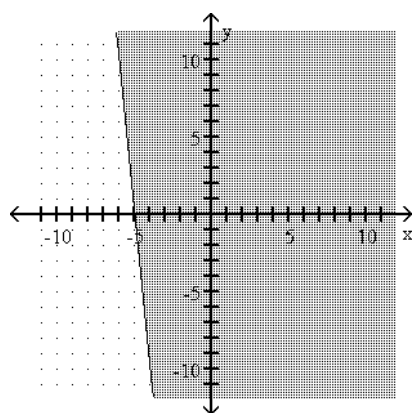
B)
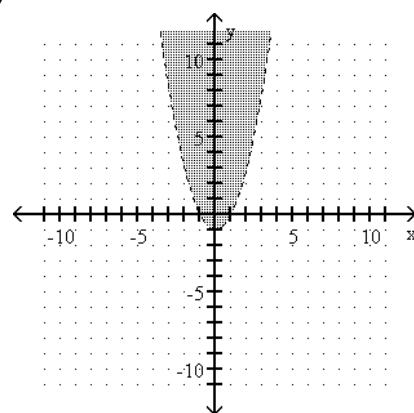
C)

D)

Graph the system of linear inequalities. Tell whether the graph is bounded or unbounded, and label the corner points.

20)
$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x + y \leq 9 \\ x + y \geq 4 \end{cases}$$

A) no solution
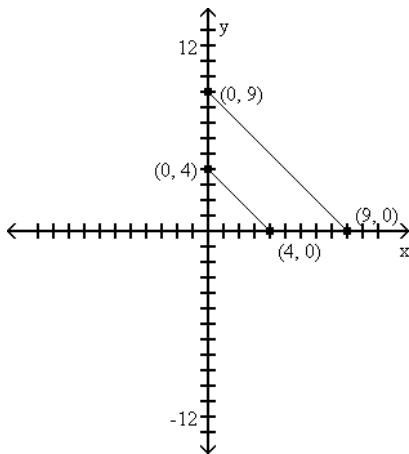
B) unbounded;
corner points (0, 0), (0, 4), (4, 0)

C) bounded;
corner points (9, 0), (0, 9),(0, 4), (4, 0)

D) unbounded;
corner points (9, 0), (0, 9)

Solve the problem.

21) If n(A) = 25, n(B) = 18, and n(A ∪ B) = 35, find n(A ∩ B).

A) 27   B) 43   C) 16   D) 8

5

Use the information given in the figure.

22)

How many are in set A?

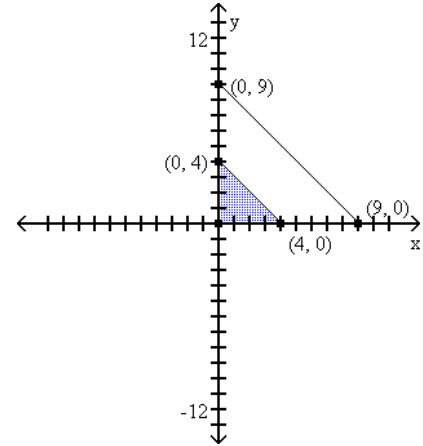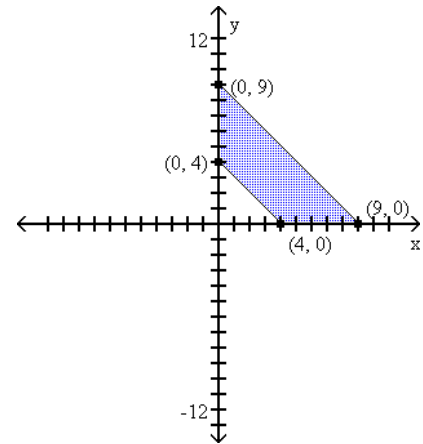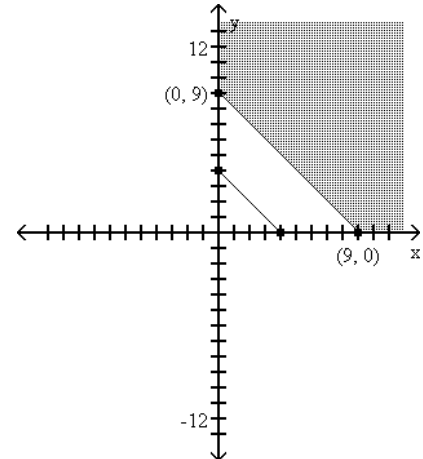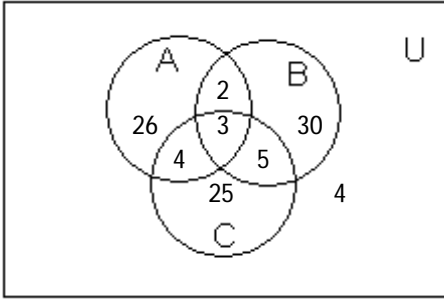   A) 35   B) 26   C) 39   D) 32

23)
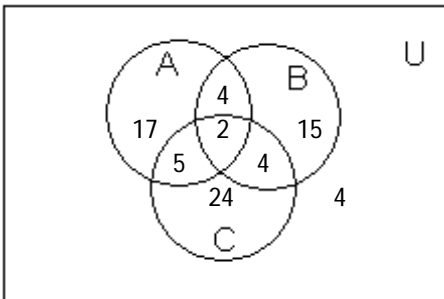
How many are in B or C?

   A) 6   B) 54   C) 52   D) 43

24)
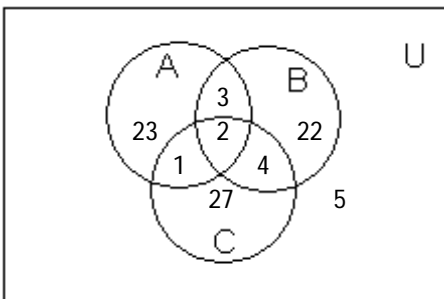
How many are not in C?

   A) 53   B) 50   C) 48   D) 55

Solve the problem.

25) In a survey of 50 hospital patients, 19 said they were satisfied with the nursing care, 16 said they were satisfied with the medical treatment, and 5 said they were satisfied with both. How many patients were satisfied with neither? How many were satisfied with only the medical treatment?

   A) 20; 16   B) 14; 11

   C) 25; 16   D) 20; 11

26) In a student survey, 115 students indicated that they speak Spanish, 27 students indicated that they speak French, 9 students indicated that they speak both Spanish and French, and 140 students indicated that they speak neither. How many students participated in the survey?

   A) 133   B) 273

   C) 264   D) 282

Find the value of the permutation.

27) $P(9, 4)$

   A) 15,120   B) 240

   C) 3024   D) 1512

Solve the problem.

28) List all the ordered arrangements of 4 objects 1, 2, 3, and 4 choosing 3 at a time without repetition. What is P(4, 3)?

   A) 123, 124, 134, 234
      P(4, 3) = 4

   B) 123, 124, 132, 134, 142, 143, 213, 214, 231, 234, 241, 243, 312, 314, 321, 324, 341, 342, 412, 413, 421, 423, 431, 432
      P(4, 3) = 24

   C) 111, 112, 113, 114, 121, 122, 123, 124, 131, 132, 133, 134, 141, 142, 143, 144, 211, 212, 213, 214, 221, 222, 223, 224, 231, 232, 233, 234, 241, 242, 243, 244, 311, 312, 313, 314, 321, 322, 323, 324, 331, 332, 333, 334, 341, 342, 343, 344, 411, 412, 413, 414, 421, 422, 423, 424, 431, 432, 433, 434, 441, 442, 443, 444
      P(4, 3) = 64

   D) 123, 124, 132, 142, 143, 213, 214, 231, 241, 243, 312, 314, 321, 341, 342, 412, 413, 421, 423, 431
      P(4, 3) = 20

29) In how many ways can 4 people each have different birth months?

   A) 20,736   B) 495
   C) 48   D) 11,880

Find the value of the combination.

30) C(13, 8)

   A) 154,440   B) 1287
   C) 25,945,920   D) 240

Solve the problem.

31) List all the combinations of 4 objects 1, 2, 3, and 4 taken 3 at a time. What is C(4, 3)?

   A) 111, 112, 113, 114, 121, 122, 123, 124, 131, 132, 133, 134, 141, 142, 143, 144, 211, 212, 213, 214, 221, 222, 223, 224, 231, 232, 233, 234, 241, 242, 243, 244, 311, 312, 313, 314, 321, 322, 323, 324, 331, 332, 333, 334, 341, 342, 343, 344, 411, 412, 413, 414, 421, 422, 423, 424, 431, 432, 433, 434, 441, 442, 443, 444
      C(4, 3) = 64

   B) 123, 124, 134, 234, 321, 432
      C(4, 3) = 6

   C) 123, 124, 134, 234
      C(4, 3) = 4

   D) 123, 124, 132, 134, 142, 143, 213, 214, 231, 234, 241, 243, 312, 314, 321, 324, 341, 342, 412, 413, 421, 423, 431, 432
      C(4, 3) = 24

32) An exam consists of 9 multiple-choice questions and 6 essay questions. If the student must answer 7 of the multiple-choice questions and 4 of the essay questions, in how many ways can the questions be chosen?

   A) 1512   B) 65,318,400
   C) 540   D) 261,273,600

33) In a probability model, which of the following numbers could be the probability of an outcome:

$$0,\ 0.2,\ -0.01,\ -\frac{1}{3},\ \frac{1}{2},\ \frac{5}{4},\ 1,\ 1.5$$

   A) $0,\ 0.2,\ \frac{1}{2},\ 1$

   B) $0,\ 0.2,\ -0.01,\ 1,\ 1.5$

   C) $0.2,\ \frac{1}{2},\ 1$

   D) $0,\ 0.2,\ -0.01,\ -\frac{1}{3},\ \frac{1}{2},\ 1$

34) Two 6-sided dice are rolled. What is the probability the sum of the two numbers on the dice will be 3?

A) 2

B) $\dfrac{1}{2}$

C) $\dfrac{1}{18}$

D) $\dfrac{17}{18}$

Evaluate the expression.

35) $\begin{pmatrix} 4 \\ 2 \end{pmatrix}$

A) 4   B) 1   C) 0   D) 6

Expand the expression using the Binomial Theorem.

36) $(x + 1)^6$

A) $x^6 + 6x^5 + 15x^4 + 20x^3 + 15x^2 + 6x + 1$

B) $x^6 + 6x^5 + 30x^4 + 120x^3 + 30x^2 + 6x + 1$

C) $x^6 + 6x^5 + 15x^4 + 20x^3 + 15x^2 + 6x + 6$

D) $x^6 + 6x^5 + 30x^4 + 120x^3 + 360x^2 + 720x + 720$

37) $(5x + 2)^3$

A) $25x^2 + 20x + 4$

B) $125x^3 + 150x^2 + 60x + 8$

C) $125x^3 + 150x^2 + 150x + 8$

D) $25x^6 + 10x^3 + 64$