SATPREP
Assignment : *Algebraic Inequality*

Easy

1. There are 15 boxes of apples in the storage room. Each box has at least 21 apples, and at most 28 apples. Which of the following could be the total number of apples in the storage room?
   a) 200
   b) 250
   c) 300
   d) 350

2. Alex has less money than Bob and Bob has less money than Chris. If a, b, and c represent the amounts of money that Alex, Bob, and Chris have, respectively, which of the following is true?
   a) $a < b < c$
   b) $c < b < a$
   c) $b < a < c$
   d) $a < c < b$

3. If $x > y$, $w < z$, and $x < w$, which of the following must be true?
   I. $y < z$
   II. $w < y$
   III. $x < z$
   a) None
   b) II and III
   c) I and II
   d) I and III

4. If $0 < xy$ and $y < 0$, which of the following statements must be true?
   I. $x < 0$
   II. $x < y$
   III. $x > 0$
   a) I only
   b) III only
   c) I and II
   d) II and III

5. If $0 > x > y$, which of the following is less than $\frac{x}{y}$?

a) 1
b) 2
c) xy
d) $\frac{x}{2y}$

6. If $x - 1 > 2$ and $x + 2 < 7$, which of the following could be a value for x?

a) 1
b) 2
c) 3
d) 4

7. If $5x < 3y$ and $6y < 7z$, which of the following is true?

a) $5x < 7z$
b) $5x > 7z$
c) $10x < 7z$
d) $10x = 7z$

8. Given that $4x + 3 < 12$, which of the following cannot be the value of x?

a) 3
b) 2
c) 1
d) 0

9. If $|3 - 2y| < 11$, which of the following is a possible value of y?

a) −6
b) −4
c) 5
d) 10

10. If $a + 3b < a$, which of the following must be true?

a) $a > 0$
b) $a = 0$
c) $a < 0$
d) $b < 0$

11. If 3 less than x is a negative number and if 1 less than x is a positive number, which of the following could be the value of x?
    a) 3
    b) 2
    c) 1
    d) 0

12. If $x + y = 13$ and $x < 7$, then which of the following must be true?
    a) $y > 0$
    b) $y < 13$
    c) $y = 6$
    d) $y > 6$

13. Which of the following conditions would make $2x - y < 0$?
    a) $2x = y$
    b) $x > 0$
    c) $y > 0$
    d) $2x < y$

Medium

14. If $x < 5 < \frac{1}{x-1}$, then x could be which of the following?
    a) 5
    b) 1
    c) $\frac{1}{5}$
    d) $\frac{7}{6}$

15. If $|y| < 1$ and $y \neq 0$, which of the following statements is always true?
    I. $y < 3y$
    II. $y^2 < y^3$
    III. $y^2 < \frac{1}{y^2}$
    a) I only
    b) II only
    c) III only
    d) I and III

16. If $|x| < 1$, which of the following is the greatest?
    a) 2
    b) $1 - x$
    c) $1 + x$
    d) $2x$

17. What is the smallest positive integer value of x for which $2x - 7 > 0$?

18. If x is an integer and $2x + 1$ is the median of three different integers $2x + 1$, $x - 1$, and $3x - 1$, which of the following could be a possible value of x?
    a) -1
    b) 0
    c) 1
    d) 3

19. When the positive integer P is increased by 30 percent, the result is between 9 and 10. What is the value of P?

20. The scores of a math class midterm are between 75 and 93. Which of the following inequalities can be used to determine the range of a student's midterm score, represented by h in this class?
    a) $|h - 75| < 18$
    b) $|h - 93| < 18$
    c) $|h - 84| < 18$
    d) $|h - 84| < 9$

21. If $|5 - 2x| < 3$, which of the fol1owing is a possible value of x?

a) 3
b) 4
c) 5
d) 6

22. If the side length of a square is an integer and the area of this square is less than 25 but greater than 15, what is the perimeter of the square?

Hard

Questions 23 – 24 refer to the following information:
Jenny has a summer job at an ice cream shop. She needs to order a few boxes of small cups and a few boxes of large cups. The storage room can hold up to 30 boxes. Each box of small cups costs $20 and each box of large cups costs $30. A maximum of $720 is budgeted for cups.

23. If x represents the number of boxes of small cups and y represents the number of boxes of large cups that Jenny can order, which of the following systems of equations represents the number of each she could order?

a) $\begin{cases} x \geq 0 \\ y \geq 0 \\ x + y \leq 30 \\ 20x + 30y \leq 720 \end{cases}$

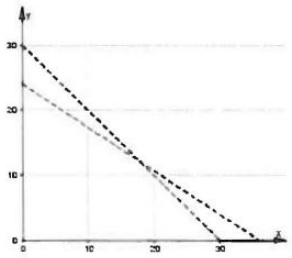
b) $\begin{cases} x \geq 0 \\ y \geq 0 \\ x + y < 30 \\ 20x + 30y < 720 \end{cases}$

c) $\begin{cases} x \geq 0 \\ y \geq 0 \\ x + y > 30 \\ 20x + 30y > 720 \end{cases}$

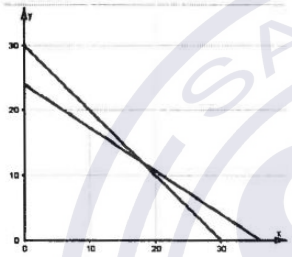
d) $\begin{cases} x \geq 0 \\ y \geq 0 \\ x + y \geq 30 \\ 20x + 30y \leq 720 \end{cases}$

24. Which of the following graphs represents the number of boxes of each type of cup she could order?

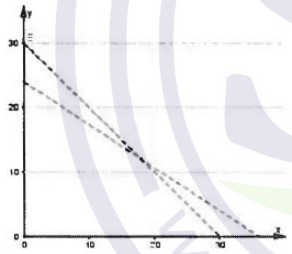
a)



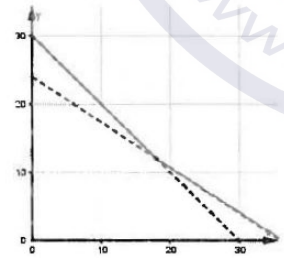
b)



c)



d)



25. If $x + 2 < y + 1 < 0 < z$, which of the following must be true?

I. $-y > -x$
II. $xz < yz$
III. $x + y < z - 1$

a) I only
b) II only
c) III only
d) II and III only

26. If $x > 0$, $y > 2$, and $2x + y = 5$, and x is an integer, what is the value for x?

a) 1
b) 2
c) 3
d) 4

27. If w is a positive number and $w > w^2$, which of the following statements is true?

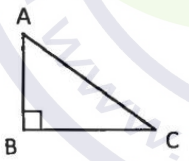
I. $w^2 > w^3$
II. $w > \frac{w}{3}$
III. $w > w^3$

a) I, II
b) II, III
c) I, II, and III
d) I only

$$f(x) = |x - 6|$$

28. For the function defined above, what is the value of c such that $f(2c) < c$?

a) −3
b) −1
c) 1
d) 3



29. In the figure above, ΔABC is a right triangle and $\overline{AB}$ has the length of 5. If the area of ΔABC must be more than 25 but less than 35 and all three sides' lengths are positive integer, what is one possible value of AC?

a) 10
b) 11
c) 12
d) 13