1

If x is positive, which of the following could be correct ordering of $\frac{1}{x}$, $2x$, and x^2?

(I) $x^2<2x<\frac{1}{x}$
(II) $x^2<\frac{1}{x}<2x$
(III) $2x<x^2<\frac{1}{x}$

(a) none
(b) I only
(c) III only
(d) I and II
(e) I, II and III

2

In a room filled with 7 people, 4 people have exactly 1 sibling in the room and 3 people have exactly 2 siblings in the room. If two individuals are selected from the room at random, what is the probability that those two individuals are NOT siblings?

A. 5/21
B. 3/7
C. 4/7
D. 5/7
E. 16/21

3

If x > y^2 > z^4, which of the following statements could be true?

I. x>y>z
II. z>y>x
III. x>z>y

A. I only
B. I and II only
C. 1 and III only
D. II and III only
E. I, II and II

4

In the infinite sequence A, An = X^(n-1) + X^n + X^(n+1) + X^(n+2) + X^(n+3) where x is a positive integer constant. For what value of n is the ratio of An to x(1+x(1+x(1+x(1+x)))) equal to X^5?

A. 8
B. 7
C. 6
D. 5
E. 4

5

In a village of 100 households, 75 have at least one DVD player, 80 have at least one cell phone, and 55 have at least one MP3 player. If x and y are respectively the greatest and lowest possible number of households that have all three of these devices, x – y is:

A. 65
B. 55
C. 45
D. 35
E. 25

6

The water level in a rectangular swimming pool measuring 60 feet by 25 feet is to be lowered by 6 inches. How many gallons of water must be removed? (1 cu ft = 7.5 gallons)

A. 100
B. 250
C. 750
D. 1200
E. 5625

7

In a certain bathtub, both the cold-water and the hot-water fixtures leak. The cold-water leak alone would fill an empty bucket in c hours and the hot-water leak alone would fill the same bucket in h hours, where c<h. If both fixtures began to leak at the same time into the empty bucket at their respective constant rates and consequently it took t hours to fill the bucket, which of the following must be true?

I. 0 < t < h
II. c < t < h
III. c/2 < t < h/2

A) I only
B) II only
C) III only
D) I and II
E) I and III

8

If $x=\frac{3}{4}$ and $y=\frac{2}{5}$, what is the value of $\sqrt{x^2+6x+9}-\sqrt{y^2-2y+1}$?

A. 87/20
B. 63/20
C. 47/20
D. 15/4
E. 14/5

9

$$2x+y=12$$
$$|y|\leq 12$$

For how many ordered pairs (x, y) that are solutions of the system above are x and y both integers?

A. 7
B. 10
C. 12
D. 13
E. 14

10

How many times will the digit 7 be written when listing the integers from 1 to 1000?

(A) 110
(B) 111
(C) 271
(D) 300
(E) 304

11

If equation |x/2|+|y/2| = 5 encloses a certain region on the coordinate plane, what is the area of this region?

A. 20
B. 50
C. 100
D. 200
E. 400

12

100 people are attending a newspaper conference. 45 of them are writers and more than 38 are editors. Of the people at the conference, x are both writers and editors and 2x are neither. What is the largest possible number of people who are both writers and editors?

A. 6
B. 16
C. 17
D. 33
E. 84

13

If x is an integer and |1-x|<2 then which of the following must be true?

A. x is not a prime number
B. x^2+x is not a prime number
C. x is positive
D. Number of distinct positive factors of x+2 is a prime number
E. x is not a multiple of an odd prime number

14

Which of the following represents the complete range of x over which x^3 – 4x^5 < 0?

A. 0 < |x| < ½
B. |x| > ½
C. -½ < x < 0 or ½ < x
D. x < -½ or 0 < x < ½
E. x < -½ or x > 0

15

Coach Miller is filling out the starting lineup for his indoor soccer team. There are 10 boys on th team, and he must assign 6 starters to the following positions: 1 goalkeeper, 2 on defense, 2 in midfield, and 1 forward. Only 2 of the boys can play goalkeeper, and they cannot play any other positions. The other boys can each play any of the other positions. How many different groupings are possible?

A. 60
B. 210
C. 2580
D. 3360
E. 151200

16

If x represents the sum of all the positive three-digit numbers that can be constructed using each of the distinct nonzero digits a, b, and c exactly once, what is the largest integer by which x must be divisible?

(A) 3
(B) 6
(C) 11
(D) 22
(E) 222

17

What is the tenth digit to the right of the decimal point, in the decimal expansion of (1/5)^10
(A) 0
(B) 2
(C) 4
(D) 6
(E) 8

18

x/|x|<x. which of the following must be true about x ?

A. x>1
B. x>-1
C. |x|<1
D. |x|=1
E. |x|^2>1

19

On average, the bottle-nosed dolphin comes up for air once every two minutes; the beluga whale, a close relative, comes up for air on average once every five minutes. The number of times a bottle-nosed dolphin would come up for air in a 24 hour period is approximately what percent greater than the number of times a beluga whale would come up for air in that same period?

A. 50%
B. 100%
C. 150%
D. 200%
E. 250%

20

In the rectangular coordinate system shown above, which quadrant, if any, contains no point (x, y) that satisfies the inequality 2x-3y≤−6? (the quadrants are the standard quadrants in a co-ordinate system, I can't really draw it out here)

A. None
B. I
C. II
D. III
E. IV

21

If $\frac{x}{|x|}<x$ which of the following must be true about x?

(A) $x>1$

(B) $x>-1$

(C) $|x|<1$

(D) $|x|=1$

(E) $|x|^2>1$

22

A certain business produced x rakes each month form November through February and shipped x/2 rakes at the beginning of each month from March through October. The business paid no storage costs for the rakes from November through February, but it paid storage costs of $0.10 per rake each month from March through October for the rakes that had not been shipped. In terms of x, what was the total storage cost, in dollars, that the business paid for the rakes for the 12 months form November through October?

A. 0.40x
B. 1.20x
C. 1.40x
D. 1.60x
E. 3.20x

23

Car B starts at point X and moves clockwise around a circular track at a constant rate of 2 mph. Ten hours later, Car A leaves from point X and travels counter-clockwise around the same circular track at a constant rate of 3 mph. If the radius of the track is 10 miles, for how many hours will Car B have been traveling when the cars have passed each other for the first time and put another 12 miles between them (measured around the curve of the track)?

A. 4pi – 1.6
B. 4pi + 8.4
C. 4pi + 10.4
D. 2pi – 1.6
E. 2pi – 0.8

24

Is |a| + |b| > |a + b| ?

(1) a^2 > b^2
(2) |a| * b < 0

25

If the sum of the consecutive integers from –42 to n inclusive is 372, what is the value of n?

A. 47
B. 48
C. 49
D. 50
E. 51