1. The $\Gamma\Xi\Omega$ fraternity has 1000 members. For the annual members-only party, tickets were \$28 for new members, and \$40 for previous members. New members were required to attend and all did. For previous members, attendance was optional, only 70% of them attended. How much did the fraternity make on ticket sales?

   A: $\$40,000$ B: $\$12,000$ C: $\$28,000$ D: $\$47,600$ E: none of the provided

2. There are 100 people in a room and each left his/her coat in the coat room. If everybody picks a coat at random, what is the probability that exactly 99 of them receive their own coat?

   A: 1/100 B: 1/99 C: $\frac{1}{0!} - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \cdots + \frac{1}{100!}$
   D: $\frac{1}{100}(\frac{1}{0!} - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \cdots + \frac{1}{100!})$ E: none of the provided

3. A group of friends went to dinner. The bill totaled \$120. Two of them ate and left without paying. The rest of the group have to cover for them. The group calculated that if everyone gave an extra \$2, it would cover the bill. How many people were in the original group that went to dinner?

   A: 16 B: 10 C: 12 D: 8 E: none of the provided

4. Suppose that $\log_a(b) = 3$. Then $b^{\frac{1}{3}}$ is equal to:

   A: a B: 3 C: 3^a D: 3^b E: none of the provided

5. The coefficient of the term $x^3y^5z^2$ in the expansion of $(x + y + z)^{10}$ is:

   A: $1,260$ B: $5,040$ C: $2,520$ D: $1,230$ E: none of the provided

6. The quantity $\log_b(a)\log_c(b)\log_a(c)$ equals:

   A: 1 B: $\log(b)$ C: $\log(a)$ D: 2 E: none of the provided

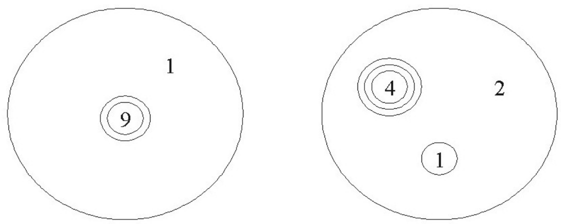
7. Given a six-sided regular die, you repeatedly roll the die until the sum of the rolled numbers is greater than or equal to 3. What is the probability of rolling an exact sum of 3?

   A: $\frac{97}{216}$ B: $\frac{133}{216}$ C: $\frac{61}{216}$ D: $\frac{49}{216}$ E: none of the provided

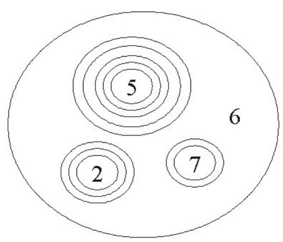
8. Evaluate $1 - 2 - 3 + 4 - 5 - 6 + \cdots + 9991 - 9992 - 9993$ (that is, for all the integers between 1 and 9993, inclusive, all those with a remainder of 1 when divided by 3 have plus signs, and all other numbers have minus signs.)

   A: -16,651,670 B: -16,651,669 C: -16,651,671 D: -16,651,672
   E: none of the provided

9. If the numbers 901 and 4,012 are represented as



   what number does the following figure represent?



   A: 502,706 B: 50,276 C: 520,760 D: 520,706 E: none of the provided

10. How many solutions are there to the equation?

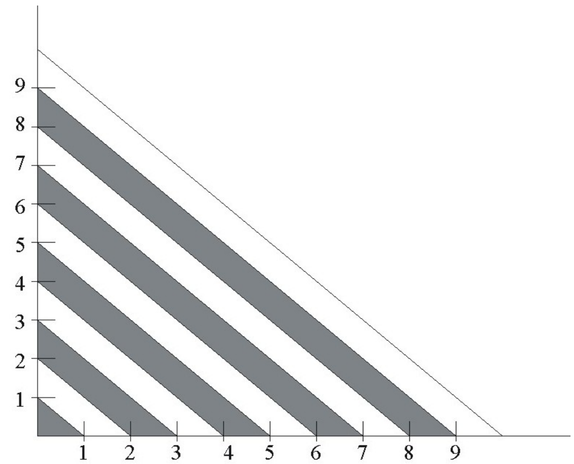
$$\cos(\ln x) = 0, \quad 0 < x < 1,$$

   A: ∞ B: 1 C: 0 D: 2 E: none of the provided

11. The minimum value for $f(x, y) = x^2 + y^2 - 6x + 22y + 99$ is:

   A: 99 B: -31 C: 0 D: 39 E: none of the provided

12. The area of the shaded region is



A: 22.5 B: 20.5 C: 18 D: 20 E: none of the provided

13. You drove from City A to City B for a total distance of 80 miles. You drove an average speed of 80 mph on the first mile, 79 mph on the second mile, with speed continuing to decrease 1 mph every mile, so that you drove an average speed of 1 mph on the last mile. How long is the trip?

A: $4,800(1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{80})$ sec B: $3,600(1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{80})$ sec
C: $4,800(1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{60})$ sec D: $6,400(1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{60})$ sec
E: none of the provided

14. A true 5-digit number is an integer that cannot begin with a 0. It is a palindrome if it reads the same backward and forward. Consider a true 5-digit number that is a palindrome in the last four digits and has the property that if you add one to the integer, the result is a 5-digit palindrome. How many such true 5-digit numbers are there?

A: 9 B: 10 C: 8 D: 11 E: none of the provided

15. Let n be a positive integer. The function $\tau(n)$ is the number of positive divisors of n. For example, $\tau(6) = 4$. The number of n between 1 and $10,000$, inclusive, in which $\tau(n)$ is even is:

A: $9,900$ B: $9,901$ C: $9,099$ D: $9,909$ E: none of the provided

16. Three chickens can lay three eggs in a day and a half. How long will it take for two chickens to lay 200 eggs?

A: 115 B: 120 C: 125 D: 150 E: none of the provided

17. Let R be the region of points on a plane satisfying the inequality $|x| + |y| \leq 1$. The area of R equals:

A: 3 B: 1 C: 2 D: 4/3 E: none of the provided

18. Suppose $x > 0$ and $\sqrt{x} + \frac{1}{\sqrt{x}} = 3$. Then $\sqrt{x} - \frac{1}{\sqrt{x}}$ equals:

A: $2\sqrt{5}$ or $-2\sqrt{5}$ B: $\sqrt{5}$ or $-\sqrt{5}$ C: $\sqrt{5}$ D: $2\sqrt{5}$ E: none of the provided

19. Let $P(A) = 0.7$ and $P(B) = 0.3$. Let B^c denote the complement of the set B. Then the smallest value of $P(A \cap B^c)$ is:

A: 3 B: 0 C: 0.6 D: 0.4 E: none of the provided

20. How many ways can we order nine computer programs if program 2 cannot immediately follow program 1?

A: $32,2560$ B: $36,2880$ C: $40,320$ D: $18,1440$ E: none of the provided

21. How many ways can 12 people be partitioned into three groups of four people?

A: $2,000$ B: $34,650$ C: $17,320$ D: $5,775$ E: none of the provided

22. A certain cookie store sells six different types of cookies. How many ways are there to fill a box of cookies if the box holds ten cookies and cookies may be placed in any order?.

A: $6,006$ B: $3,003$ C: $1,001$ D: $1,200$ E: none of the provided

23. A ball is dropped from a height of two feet. The ball bounces to 0.9 of its previous height after each bounce. What is the total distance traveled by the ball?

A: 36 feet   B: 38 feet   C: 18 feet   D: 20 feet   E: none of the provided

24. From the set $\{1, 2, 4, 8\}$ two different numbers, a and b, are selected at random. What is the probability that the quantity $a - b$ is odd and positive?

A: 1/2   B: 0   C: 1/4   D: 1/3   E: none of the provided

25. How many distinct sets of real solutions does the following system possess? $\begin{cases} x^2 - xy + 3 = 0 \\ x^2 - 3x + y = 0 \end{cases}$

A: 2   B: 1   C: 3   D: 4   E: none of the provided

26. Given $\tau_1 = 1, \tau_2 = 2$ and for $n \geq 3$, $\tau_n = \begin{cases} \frac{\tau_{n-2}}{2} & \text{if } \tau_{n-2} \text{ is even} \\ \tau_{n-2} + 1 & \text{if } \tau_{n-2} \text{ is odd} \\ 4 & \text{if } \tau_{n-2} = 0 \end{cases}$. Then the value of τ_{2008} is:

A: 4   B: 0   C: 2   D:1   E: none of the provided

27. A number x, when divided by 32, gives a remainder of 18. When it is divided by 9, it gives a remainder of 1. What is the remainder when x is divided by 6?

A: 2   B: 1   C: 4   D: 0   E: none of the provided

28. If $f(x + y) = f(x) + xy + f(y)$ and $f(5) = 70$, then $f(9)$ equals:

A: 100   B: 144   C: 121   D: 88   E: none of the provided

29. If a new sequence is obtained by removing all the perfect squares from the sequence of all positive integers, then the 2008th term of the new sequence is:

A: $2,052$ B: $2,053$ C: $2,054$ D: $2,051$ E: none of the provided

30. How many solutions are there to the following equation?

$$\left(x^2+5\,x+5\right)^{x^2+5\,x}=1$$

A: 2 B: 4 C: 6 D: 0 E: none of the provided

31. For two real numbers x and y which satisfy the equations

$$-\sec^2\,x+\tan^2\,y=a^2 and \quad \tan^2\,x-\sec^2 y=\frac{5}{6}\,a-3,$$

the values of a are:

A: $\frac{2}{3},\ -\frac{3}{2}$ B: $-\frac{2}{3},\ \frac{3}{2}$ C: not real D: $-\frac{5}{12}\pm\frac{\sqrt{745}}{12}$ E: none of the provided

32. For $\triangle$ABC, D is a point on side BA such that $|BD|=\frac{1}{4}$ BA; E is a point on side AC such that $|AE|=\frac{1}{4}$ AC; F is a point on side CB such that $|CF|=\frac{1}{4}$ CB. If the area of $\triangle$ABC is S, then the area of $\triangle$DEF is:

A: $\frac{1}{4}$ S B: $\frac{3}{4}$ S C: $\frac{9}{16}$ S D: $\frac{7}{16}$ S E: none of the provided

33. The real number k for which the function

$$f(x)=k\left(\sin^6 x+\cos^6 x\right)+\sin^4 x+\cos^4 x$$

is constant is:

A: $\frac{3}{2}$ B: $-\frac{2}{3}$ C: 1 D: -1 E: none of the provided

34. F_1 and F_2 are the two foci of the ellipse

$$\frac{x^2}{9}+\frac{y^2}{4}=1.$$

Let P be a point on the ellipse such that $|\overline{PF}_1|=2\,|\overline{P\,F}_2|$, where $|\overline{PF}|$ represents the distance between the two points P and F. The area of $\triangle PF_1F_2$ is:

A: 3 B: 4 C: $\sqrt{5}$ D: $\frac{\sqrt{13}}{2}$ E: none of the provided

35. If x and y are two non-zero real numbers which satisfy the equation

$$x^2 + y^2 = (x+y)^3,$$

then $x + y$ is at least:

A: $\frac{1}{2}$ B: 1 C: 2 D: $\sqrt{2}$ E: none of the provided

36. Four students are selected from a group of 2 sixth graders, 3 seventh graders and 4 eighth graders. What is the probability that at least one student is selected from each grade?

A: $\frac{13}{21}$ B: $\frac{1}{3}$ C: $\frac{4}{21}$ D: $\frac{4}{7}$ E: none of the provided

37. Suppose that x and y are in $(-2, 2)$ and $x\,y = -1$. The minimum value of

$$\frac{4}{4-x^2} + \frac{9}{9-y^2}$$

is:

A: $\frac{8}{5}$ B: $\frac{24}{11}$ C: $\frac{12}{7}$ D: $\frac{12}{5}$ E: none of the provided

38. At a group dinner, 42 people ordered seafood meals while 77 people ordered chicken meals. The total cost of seafood meals was lower than the cost for chicken meals. But if 44 people ordered seafood meals while 77 people ordered chicken meals, then the cost of seafood meals would be higher than the cost of the chicken meals.

Assuming that the cost of each order is a whole number, then the cost of a seafood meal is:

A: at least \$11 B: no more than \$9 C: at least \$9 D: between \$11 and \$13
E: none of the provided

39. The distance measured along a tangent line from the point $(3, 1)$ to the circle $(x+1)^2 + (y-2)^2 = 4$ is:

A: $\sqrt{17}$ B: $\sqrt{13}$ C: 4 D: 5 E: none of the provided

40. Consider the set of odd integers from 9 to 111 inclusive. How many different integers can be obtained from adding any 5 of these odd integers?

A: 103 B: 102 C: 236 D: 56 E: none of the provided