1. $f(x) = x^2 - 10x + 25$

Let A be the discriminant of f.
Let B be the coefficient of the x term of the expansion of $f(x-4)$.
Let C be the largest root of the resulting function if the graph of f is lowered 1 unit.
Let D be the y-intercept of the new function if the graph of f is translated to the right 1 unit.

Give the value of $A + \dfrac{D}{B+C}$.

2. $S = \{ 1, 2, 4, 5 \}$ and $T = \{ 3, 6, 9, 12 \}$.

Let A be the probability that an element is randomly chosen from each of sets S and T, and the two numbers have a sum of less than 5.
Let B be the probability that an element is randomly chosen from each of sets S and T, and both are prime.
Let C be the probability that 2 distinct elements are randomly chosen from set S, without replacement, and both are even.

Find the value of $\dfrac{B \square C}{A}$.

3. A right circular cylindrical container has radius 6 feet, and height 20 feet. It is filled to $\dfrac{1}{4}$ of its height with water.

Let A be the amount of water, in cubic feet, which will have to be added to the container in order to raise the water level 1 foot.
Let B be the height in feet of water, if the volume of water is increased by 10%.
Let C be the height in feet of water if the original radius was decreased by 20%, and the amount of water remained the same.
A speck of dust is floating on the top surface of the water in the container. **Let D** be the maximum distance in feet between the speck and a point on the bottom base's circumference.

Give the value of $\dfrac{A}{\pi} + 10B + 32C + D$.

4. In a company, there were exactly 40 employees on January 1, 2009. Of those employees, 20 each made \$10 per hour, and the rest each made \$5 per hour. On February 1, 2009, ten (10) of these employees quit their job at this company.

Let A be the least possible average (arithmetic mean) per hour pay at this company on February 2, 2009, if no other employees quit and no new employees were hired. A should be written as a fraction in reduced form.

Let B be the least possible number of employees who can be hired on February 2, 2009 at \$10 per hour to make sure that the average (arithmetic mean) per hour pay is greater than \$9, if the quitters had all made \$5 per hour.

Give the value of $6A + B$.

5. **Let A be** the least positive value of x such that $|2x-10| = 9$.

Let B be the least integral value of x such that $|3-4x| < 10$.

Let C be the positive value of x such that $\frac{x+1}{4x^2} - \frac{x+3}{2x} = \frac{-3}{8x}$.

Let D be the value of x such that $\sqrt{x}+1 = \sqrt{x+3}$.

Give the value of $A + B + C + D$

6. I. $u+v$ II. $u+1$ III. $|1-u|$ IV. $2uv$

Let A be the number of values above (I through IV) which must be odd for u and v both odd.

Let B be the number of values above (I though IV) which must be even if u and v are both even.

Let C be the number of values above (I through IV) which must be odd for u an odd integer and v an even integer.

Let D be the number of values above (I through IV) which must be even for u an odd integer and v an even integer.

Find the sum $A + B + C + D$.

7. Let R, S and T be three consecutive odd integers, respectively.

If $R + T = 34$ then let A be the value of $R + S + T$.

If T is 5 times R then let $B = 3S$.

If $S + T = 44$ then let $C = R + S$.

Let D be the value of $\frac{R-T}{R-S}$.

Give the value of $A+B+C+D$.

8. $R^{\frac{1}{3}} \square R^{\frac{1}{3}} \square R^{\frac{1}{3}} = 8$ and $S^{\frac{2}{3}} \square S^{\frac{2}{3}} \square S^{\frac{2}{3}} = 8$

Let $A = \sqrt{R^{\frac{2}{3}}}$.

Let B be the largest possible value of $S^2 - S$.

Let C be the smallest possible value of $\frac{7}{1+S}$.

Give the value of $A+B+C$.

9. $x^2 + y^2 - 2x + 4y - 4 = 0$

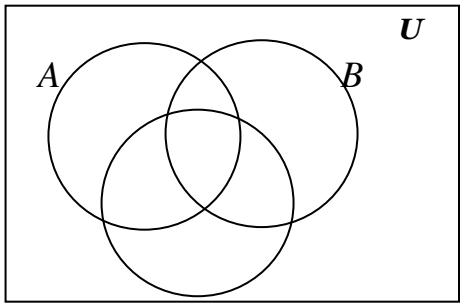
Let $A\pi$ be the area of the conic represented by the equation above.

Let B be the number of intersection points with the graph of the conic and the line $y = 0.5$.

Let C be the distance between the center of the conic and the point (7, 6).

Give the value of $A+B+C$.

10. Sets A, B and C have 20, 30 and 10 elements respectively.
$A \cap B$ has 4 elements. $A \cap C$ has 5 elements.
$B \cap C$ has 2 elements. $A \cap B \cap C$ has 1 element.



Let R be the number of elements in set $A \cup B \cup C$.
Let S be the number of elements in set A but not in set B.

Give the value of $R+S$.

11. Let $x = 2+3i$, $y = 1-i$ and $z = 1+i$.

Let $A = \frac{y}{z}$ and
let $B = x \square y$ and
let $C = |x+y+z|$ and
let $D = y^2 + z^2$.

Give the value of $A+B+C+D$.

12. Let A be the solution of $3x^{\frac{3}{2}} + 4 = 28$.
Let B be the real solution of $3x - 11\sqrt{x} = 4$.

Give the value of $A+B$.

13. Consider graph G_1 with equation $4(y-1)^2 - 9(x+2)^2 = 36$ and
graph G_2 with equation $4(x-1)^2 + (y+2)^2 = 16$.

Let A be the absolute value of the slope of an asymptote of G_1.

Let B be the length of the major axis of G_2.

Let C be the greatest y-intercept of any asymptote of G_1.

Let (D, E) and (F, H) be the coordinates of the foci of G_2 for $E < H$.

Give the sum $36A + B + C + D + H$.

14. If $x^2 = 4$ and $y^2 = 25$ and $z^2 = 1$ then

let A be the least possible value of $|x + y - z|$ and
let B be the greatest possible value of $|x + y - z|$.

Give the value of the product $A \square B$.