1. \( f(x) = \frac{3}{2}x^3 - \frac{3}{4}x + 3 \). Give \( f(3.14) \).

2. The graphs of \( f(x) = x^2 + 2x - 1 \) and \( g(x) = x + \frac{1}{f(x)} \) have 4 points of intersection. Give the sum of the \( x \) coordinates of these points.

3. Give the distance from the point \((-3,2)\) to the line \( y = 2x - 7 \).

4. Solve the system \( \begin{cases} 31x + 23y = -12 \\ 43x - 29y = 17 \end{cases} \), and give the value of \( x \).

5. The function \( f(x) = x^3 + 16x + 12 \) is invertible. Give \( f^{-1}(33.21) \).

6. Give the smallest integer value of the function \( f(x) = \frac{1}{6}x^4 - 7x^3 - 12x + 7 \).

7. Let

\[
 f(x) = \frac{2x - 1}{x + 4}.
\]

Give the 23rd value in the sequence \( f(0), f(f(0)), f(f(f(0))), \ldots \).

8. Give the average of the numbers

\[
1, \frac{2}{3}, \frac{4}{5}, \frac{6}{7}, \frac{8}{9}, \ldots, \frac{100}{101}.
\]

9. Give the number of positive solutions to

\[
\frac{x}{12} - \cos(4x) = 1.
\]

10. Give the sum of the reciprocals of the positive integer values that are smaller than 62,913, and are integer multiples of 5, 7, 11 or 13.

11. Let \( p_0 = 4327 \), and define

\[
p_{n+1} = \frac{p_n}{2} + \frac{7}{2p_n}
\]

for \( n = 0, 1, 2, 3 \). Give \( p_3 \).
12. Give the slope of the line of best least squares fit for the data \((-1,13), (1,-2)\) and \((5,-31)\).

13. A triangle is formed by joining the vertices of the parabolas \(y = x^2 - 3x + 7\), 
\[ y = -2x^2 - 3x + 2 \text{ and } y = 4 + 15x - 3x^2. \] Give the area of the triangle.

14. A point \((x, y)\) is called an integer point if both \(x\) and \(y\) are integers. Give the number 
of integer points with positive prime \(x\) coordinates that lie strictly above the graph of 
\(y = \frac{1}{2}x^2\), and strictly below the graph of \(y = 61\).

15. Give the \(y\)-intercept of the line that passes through the point \((-2.1,3.2)\) and is 
perpendicular to the line that passes through the points \((3.2,7.1)\) and \((-4.3,13.8)\).

16. Give the obtuse angle of intersection (in radians) of the lines 
\[2x - 7y = 13\] and 
\[-13x + 2y = 7.\]

17. Give the area of the intersection of the circular disk of radius 3 centered at \((1,1)\) with 
the rectangle with diagonal vertices \((-3,2)\) and \((6,0)\).

18. A number is written in base 2 as \(1100110011\). Give this number in base 10.

19. The function \(f(x) = ax^2 + bx + c\) has a graph that passes through the points 
\((1.2,2.1), (2.3,7.2)\) and \((4.2,-2.6)\). Give the maximum value of this function.

20. Give the sum of the positive integers less than 2020 that give a remainder of 3 when 
divided by 7.

21. \[1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \cdots + \frac{1}{999} = \]

22. Determine the number of roots of the function 
\[ f(x) = 12 \sin(15(x + 5)) + \frac{x^2}{30} + \frac{x}{25} \]
23. A particle moves in the direction of increasing $x$ values, along the line $y = 63 - 2x$, starting from the point associated with $x = -17$, until it comes to a point on the line whose $x$ coordinate is the first prime number. Then it changes direction and moves on a line of slope 1, until it reaches a point where the $x$ coordinate is the next prime number. It then changed direction and moves on a line of slope $-1$ until it comes to a point where the $x$ coordinate is the next prime number. It then changes direction and moves on a line of slope 1 until it comes to a point where the $x$ coordinate is the next prime number. It then changes direction and moves on a line of slope $-1$ until it comes to a point where the $x$ coordinate is the next prime number. This pattern continues until the $x$ coordinate is 2020, and the particle stops. What is the total distance traveled by the particle?

24. Let $C_1$ be the circle of radius 1 centered at the origin, and let $C_2$ be the circle of radius 2 centered at the origin. 16 equally spaced points are placed on $C_1$, with the first point $P_1 = (1,0)$, and the other 15 points $P_2, \ldots, P_{16}$ ordered in such a way that they are placed in a counter clockwise fashion around the circle. The image below captures this information.

A similar process is used to create the points $Q_1, \ldots, Q_{16}$ on the circle $C_2$, starting with $Q_1 = (2,0)$. Give the sum of the absolute values of the $x$ and $y$ coordinates of these 32 points.
25. Refer to the points created in the previous problem. Create the 16 line segments $\overline{Q_1P_2}$, $\overline{Q_2P_4}$, $\overline{Q_3P_6}$, $\ldots$, $\overline{Q_8P_{16}}$, $\overline{Q_9P_2}$, $\overline{Q_{10}P_4}$, $\ldots$, $\overline{Q_{16}P_{16}}$. Give the sum of the lengths of these line segments.

26. **Tie Breaker**: Give the average of the correct answers to problems 1-25. The closest answer to the actual answer breaks the tie.