

Question	Answer	Solution
1	48	Setting up the inequality to solve: $-48 < 2x - 5 < 48$ leads to $-43 < 2x < 53$ The solution is $-21.5 < x < 26.5$ There are 21 negative solutions, 0, and 26 positive solutions for a total of 48.
2	98	Simplifying pairs in the numerator and denominator results in $\frac{8 \cdot 7 \cdot 7 \cdot 6}{24} = 98$
3	± 25	Converting to exponential form: $5^4 = x^2$ Taking square root of both sides gives $x = \pm 25$
4	- 27	Find the inverse of P(x): $x = (5 + \sqrt[3]{y})^3 \Rightarrow \sqrt[3]{x} = 5 + \sqrt[3]{y} \Rightarrow y = (\sqrt[3]{x} - 5)^3$ which is Q(x). $Q(8) = (\sqrt[3]{8} - 5)^3 = (2 - 5)^3 = - 27$
5	- 3	Slope = $\frac{1 - (-3)}{3 - 1} = 2$ Plugging in m=2 with (1, -3) $(y+3) = 2(x - 1)$ leads to $y = 2x - 5$ so b = -5 and $(m + b) = 2 + (-5) = -3$
6	$\frac{8}{15}$	Clearing the denominators in the equation : $9x - 5 = A(x + 5) + B(x - 5)$ or $9x - 5 = Ax + Bx + 5A - 5B$ Setting like terms equal: $9 = A + B$ and $-5 = 5A - 5B$ Solving the two equations together results in $A = 4$ and $B = 5$, so $\frac{2A}{3B} = \frac{8}{15}$
7	26	For any $z = a + bi$, $ z = \sqrt{a^2 + b^2}$. Thus $ z = \sqrt{10^2 + 24^2} = \sqrt{676} = 26$
8	2 and 3	Replace 6^x with $2^x \cdot 3^x$ and factor by grouping: $2^x \cdot 3^x - 27 \cdot 2^x - 4 \cdot 3^x + 108 = 0$ $2^x (3^x - 27) - 4(3^x - 27) = 0$ $(2^x - 4)(3^x - 27) = 0$ $2^x = 4$ so $x = 2$ and $3^x = 27$ so $x = 3$
9	$(\frac{1}{2}, 1)$ $\cup (1, 2)$ $\cup (5, \infty)$	The base of the logarithm, $2x - 1$, must be positive but not equal 1, so $x > \frac{1}{2}$ but $x \neq 1$. This gives the intervals $(\frac{1}{2}, 1) \cup (1, \infty)$. The argument of the logarithm must be positive and we can set up a sign chart whose critical values are -2, 2, and 5: -2 2 5 <

10	148	First find the factors of the polynomial by using synthetic division by positive factors of 120. 4 is the first one that works, resulting in the quotient of $x^2 - 11x + 30$ which factors into $(x - 5)(x - 6)$. Thus, the roots are 4, 5, and 6. Total surface area = $2wl + 2wh + 2hl = 2(4)(5) + 2(4)(6) + 2(6)(5) = 148$
11	11	List: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31
12	- 7	Rewriting the first two columns of the matrix and expanding along diagonals gives $\begin{bmatrix} 1 & 0 & -3 \\ 2 & -1 & 2 \\ 6 & -2 & 5 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 2 & -1 \\ 6 & -2 \end{bmatrix} = -5 + 0 + 12 - 18 + 4 - 0 = -7$
13	(1, - 2)	Substituting the 3 points into the general equation of a circle, $x^2 + y^2 + ax + by + c = 0$ gives the following equations: $- 3a + b + c = - 10$ $a + 3b + c = - 10 \Rightarrow - 4a - 2b = 0 \Rightarrow 10b = 40 \Rightarrow b = 4$ and $a = - 2$ $- 4a - 2b + c = - 20 \quad 4(a + 3b = 10) \quad c = - 20$ $x^2 + y^2 - 2x + 4y - 20 = 0 \Rightarrow (x^2 - 2x + 1) + (y^2 + 4y + 4) = 20 + 1 + 4 = 25$ Factoring gives $(x - 1)^2 + (y + 2)^2 = 25$ so the center is (1, - 2).
14	(3, - 4)	This is a horizontal parabola opening right with vertex (- 1, - 4) and $p = 4$. The focus will be 4 units to the right of the vertex, at (3, - 4).
15	2026	Take out common factor on the left side and change right side into powers of 2: $2^{6080} (2^3 - 2^2 + 2 - 1) = 5 \cdot 2^2 \cdot (2^3)^x$ $5 \cdot 2^{6080} = 5 \cdot 2^{2 + 3x}$ Setting the exponents of 2 equal: $6080 = 2 + 3x$ and $x = 2026$
16	$\begin{bmatrix} 11.5 & 10 \\ 15 & -1 \end{bmatrix}$	$B^{-1}A = \frac{1}{4} \begin{bmatrix} 0 & -2 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 4 & 2 \\ 1 & -4 \end{bmatrix} = \frac{1}{4} \begin{bmatrix} -2 & 8 \\ 12 & -12 \end{bmatrix} = \begin{bmatrix} -0.5 & 2 \\ 3 & -3 \end{bmatrix}$ $AB = \begin{bmatrix} 12 & 8 \\ 12 & 2 \end{bmatrix}$ so $AB + B^{-1}A = \begin{bmatrix} 11.5 & 10 \\ 15 & -1 \end{bmatrix}$
17	(- 4, - 7)	Factoring the numerator and denominator of the function: $y = \frac{(3x-2)(x+1)(x+4)}{(x-2)(x+4)}$ and the hole occurs when a factor divides out so $x = - 4$ Substituting $x = - 4$ into the remaining fraction gives $y = \frac{-14(-3)}{-6} = -7$ The hole occurs at (- 4, - 7).
18	10	The arguments of the logarithms must be positive so find the intervals where each argument is positive. For $(x^2 - 3x - 10) = (x - 5)(x + 2) > 0$ we find $(-\infty, -2) \cup (5, \infty)$ For $(20 - x - x^2) = (5 + x)(4 - x) > 0$ we find $(- 5, 4)$ The intersection is the interval $- 5 < x < - 2$. $(- 5)(- 2) = 10$

19	$\frac{\sqrt{7}}{4}$	Put the conic into the equation of an ellipse: $16(x^2 + 6x + 9) + 9(y^2 - 4y + 4) = -36 + 144 + 36$ $16(x+3)^2 + 9(y-2)^2 = 144 \Rightarrow \frac{(x+3)^2}{9} + \frac{(y-2)^2}{16} = 1$ $a = 4$ and $b = 3$ $c = \sqrt{a^2 - b^2} = \sqrt{7}$ Eccentricity $= \frac{c}{a} = \frac{\sqrt{7}}{4}$
20	32	$S_4 = \frac{a_1(1-r^4)}{1-r} \Rightarrow 260 = \frac{a_1\left(1-\left(\frac{2}{3}\right)^4\right)}{1-\frac{2}{3}} = \frac{a_1\left(\frac{65}{81}\right)}{\frac{1}{3}} = \left(\frac{65}{27}\right)a_1$ $a_1 = 260\left(\frac{27}{65}\right) = 108$ $a_4 = 108\left(\frac{2}{3}\right)^3 = 108\left(\frac{8}{27}\right) = 32$
21	$-18 - 16i$	Complex conjugates change the sign on the imaginary part so we need to multiply: $(5 - 2i)(-2 - 4i) = -10 - 20i + 4i - 8 = -18 - 16i$
22	$g^{-1}(x) = \ln(x+5) + 1$	Switch variables and change to logarithmic form: $g(x) = e^{x-1} - 5 \Rightarrow x = e^{y-1} - 5 \Rightarrow x+5 = e^{y-1} \Rightarrow \ln(x+5) = y-1$ Solving for y: $g^{-1}(x) = \ln(x+5) + 1$
23	1	Clearing the fractions in the equation: $x(x+2)\left(\frac{3}{x+2} + \frac{6}{x^2+2x} = \frac{4-x}{x}\right)$ $3x+6 = (4-x)(x+2)$ $3x+6 = -x^2+2x+8$ $x^2+x-2=0$ so $(x-1)(x+2)=0$ and $x=1$ or $x=-2$ -2 is extraneous.
24	45	$g(0) = -5$ and $f(-5) = 25 + 15 + 2 = 42$ $f(0) = 2$ and $g(2) = 3$ Adding these together $42 + 3 = 45$
25	$2A - B - 2C$	$\log_7 \frac{25}{12} = \log_7 \frac{5^2}{3 \cdot 2^2} = 2\log_7 5 - (\log_7 3 + 2\log_7 2)$ Substituting for the logarithms: $2A - (B + 2C) = 2A - B - 2C$