

1. (a) Convert the equation $2x + 7y = -14$ to slope-intercept form.

Then graph the equation using its slope and y -intercept.

Make sure to scale the axes and use a ruler so that your graph looks accurate and neat.

- (b) Find the equation of the line that is perpendicular to $2x + 7y = -14$ and passes through

$\left(-\frac{4}{3}, \frac{1}{2}\right)$. Write the equation in standard form with integer coefficients.

2. (a) Graph the exponential function, $t(x) = \left(\frac{1}{3}\right)^{x+2} - 1$, showing at least two points on the graph and the asymptote.

- (b) Using the graph, write the solution of the inequality $\left(\frac{1}{3}\right)^{x+2} - 1 > 0$ in interval notation

3. Consider the polynomial function $f(x) = -x^4 - 10x^3 - 28x^2 - 6x + 45$
- (a) Use Descartes' Rule of Signs to determine the number of possible positive and negative real zeros
 - (b) Use the Rational Zeros Theorem to list all of the possible rational zeros of the function
 - (c) Find all of the zeros and their multiplicities
 - (d) Use the Factor Theorem to completely factor function $f(x)$
 - (e) Graph the function using its end behavior, x -intercepts and y -intercept
 - (f) Using the graph, state the solution of $-x^4 - 10x^3 - 28x^2 - 6x + 45 > 0$ in interval notation

4. Consider the rational function $m(x) = \frac{4x^2 - 4}{x^2 + 2x - 8}$. Find the following.

(a) Vertical asymptote(s)

(b) End-behavior asymptote

(c) All intercepts

(d) The point of intersection between the graph and the end-behavior asymptote, if it exists

(e) Graph the function

(f) Using the graph, state the solution of $\frac{4x^2 - 4}{x^2 + 2x - 8} \leq 0$ in interval notation

5. Solve the exponential equation $2 \cdot 5^{x-4} + 7 = 31$ for both an exact answer and an approximation rounded to the nearest hundredth.
6. Solve the logarithmic equation $\log_2 x = \log_2(x + 5) + 3$ for both an exact answer and an approximation rounded to the nearest hundredth.
7. Find the standard form of the equation of the ellipse with co-vertices at $(-6, 1)$ and $(0, 1)$ and foci at $(-3, 5)$ and $(-3, -3)$.

8. Write the system of equations $\begin{cases} 5x + 4y = 11 \\ 3x + 2y = 7 \end{cases}$ as a matrix equation.

Then use an inverse matrix to find the solution.

9. Prove that $\sum_{n=1}^{100} 2n - 3$ defines an arithmetic series. Then find the sum.

10. Prove that $3 + 6 + 12 + 24 + \cdots + 6144$ is a geometric series. Then find the finite sum.