

1. Solve the system of equations using a matrix. *The solution should be integers.*

$$\begin{cases} x + 6y + 3z = 4 \\ 2x + y + 2z = 3 \\ 3x - 2y + z = 0 \end{cases} \quad \text{solution: } (\quad , \quad , \quad)$$

2. Set up a system of equations for the following word problem but DO NOT SOLVE. Indicate what each variable refers to.

Natural Fibers Clothing charges \$4 for shipping orders of \$25 or less, \$8 for orders from \$25.01 to \$75, and \$10 for orders over \$75. One week shipping charges for 600 orders totaled \$4280. Eighty more orders for \$25 or less were shipped than orders for more than \$75. Find the number of orders shipped at each rate.

3. Find the 11th term of the arithmetic sequence 0.07, 0.12, 0.17

4. Find the 9th term of the geometric sequence 2, -10, 50, -250, ...

5. Find the sum of the first 300 natural numbers (1, 2, 3, ...).

6. Find the sum of the first 10 terms of the geometric series $16 - 8 + 4 - \dots$.

Find the sum of the infinite geometric series:

7. $\sum_{k=1}^{\infty} \left(\frac{7}{10}\right)^k$

8. $\sum_{k=1}^{\infty} \frac{8}{3} \left(\frac{1}{2}\right)^{k-1}$

Expand the binomial using Pascal's triangle.

9. $(x - 1)^4$

10. $(x + y)^8$

Expand the binomial using the binomial theorem (and simplify).

11. $(x - \sqrt{2})^6$

12. $(1 + 2q^3)^8$

Find the specified term of the binomial using the binomial theorem.

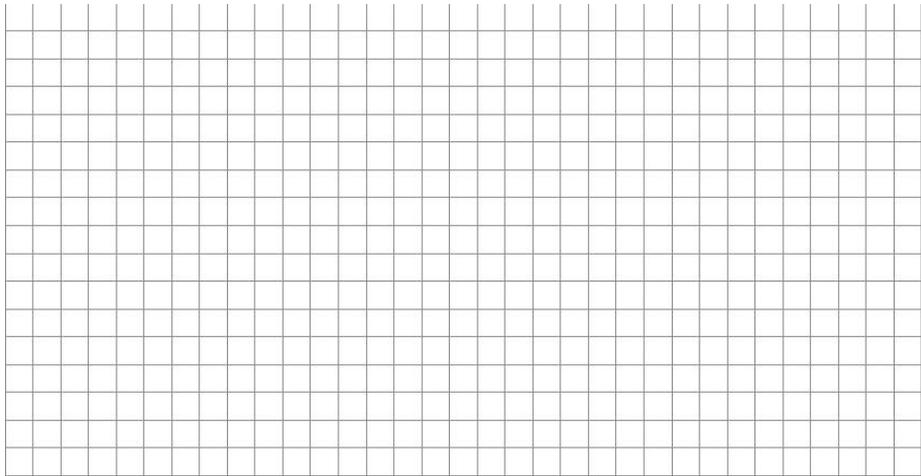
13. $(p - 2q)^9$; 5th

14. $\left(\frac{1}{b^2} + \frac{b}{3}\right)^7$; 4th

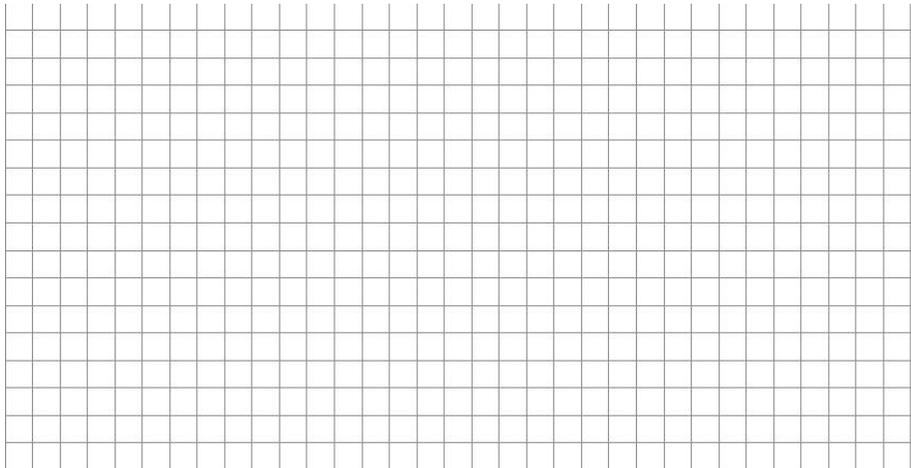
15. Write and simplify the difference quotient for the function $f(x) = 3x^2 - 2x + 4$.

Graph the functions using transformations (include dotted line for original, unshifted graph):

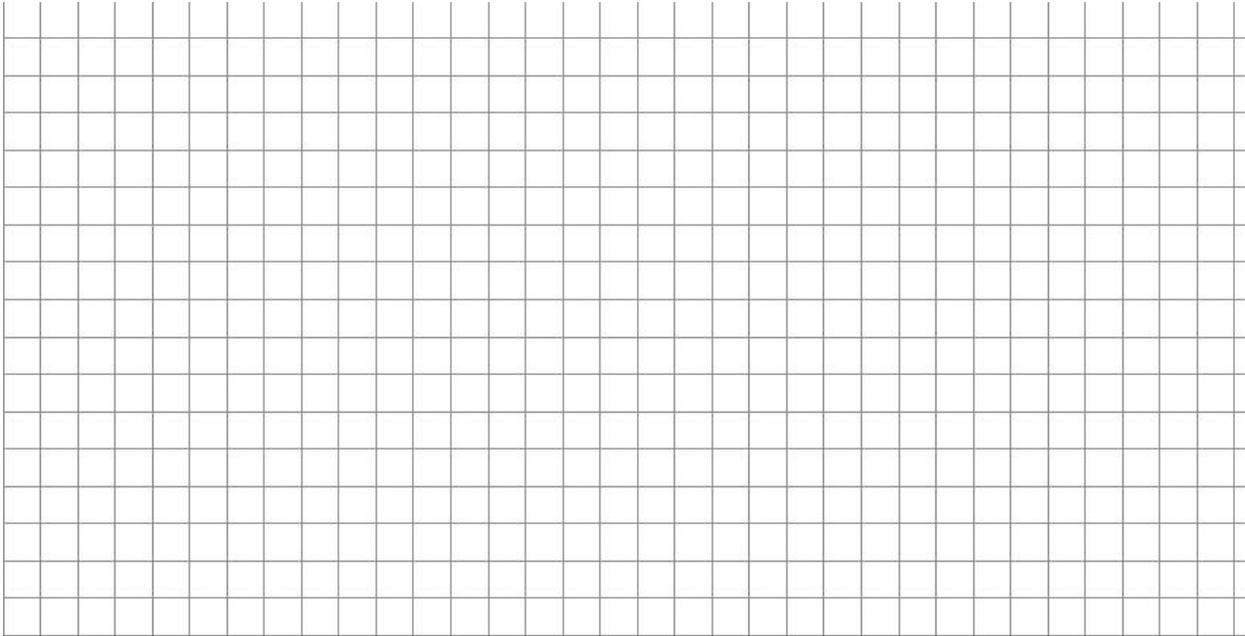
16. $f(x) = 2\sqrt[3]{x-1} + 3$ *include labels for at least 3 reference points!*



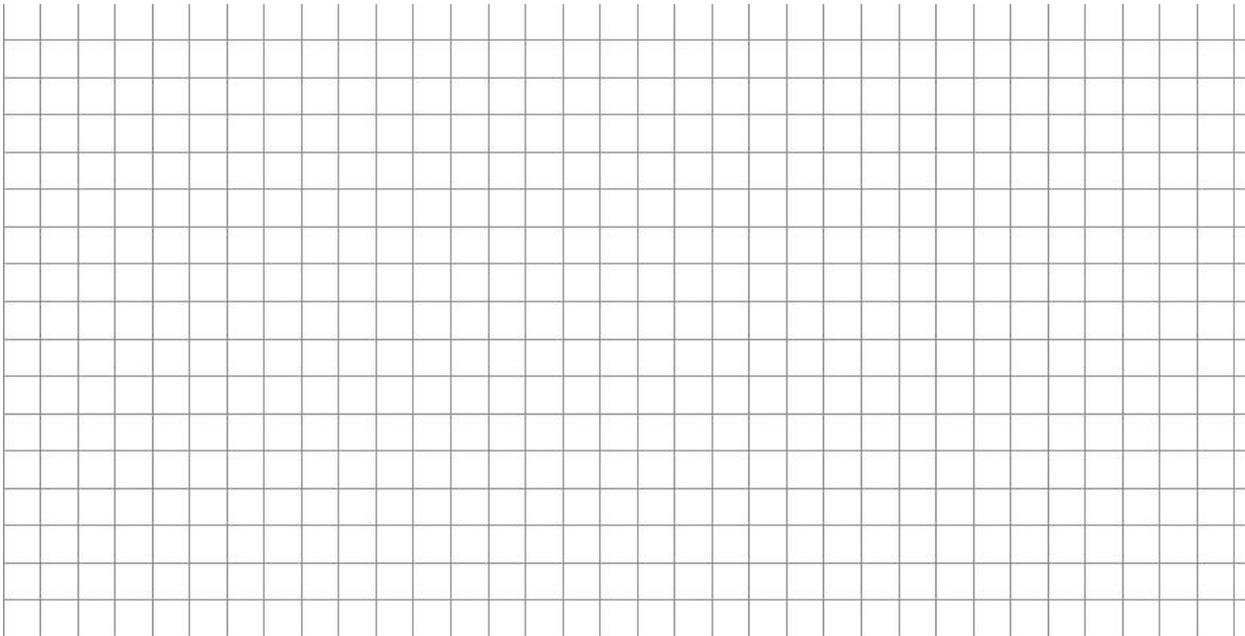
17. $f(x) = -\log_2(x + 3) - 1$ *include labels for at least 3 reference points!*



18. Find the zeros and their multiplicities,, y-intercept, determine end behavior of using the lead term test, and graph the polynomial $f(x) = -x^3 + 2x^2 + 4x - 8$ include labels for intercepts



19. Find the zeros, y-intercept, vertical asymptotes, horizontal or oblique asymptotes, and graph the rational function $f(x) = \frac{x^3 - 3x^2 - 18x + 40}{x^2 + 6x + 5}$ label the usual; scale down to make sure your graph fits!



20. Solve the polynomial inequality.

$$x^5 - 5x^3 + 4x < 0$$

21. Solve the rational inequality.

$$\frac{x + 2}{x^2 + 2x - 15} \geq 0$$

Solve the logarithmic and exponential equations:

22. $\log_2(x + 3) - \log_2(x - 1) = 5$

23. $\frac{10^x - 10^{-x}}{10^x + 10^{-x}} = \frac{1}{2}$

24. Sodium-24 is a radioactive isotope of sodium that is used to study circulatory dysfunction. Assuming that 4 micrograms of sodium-24 is injected into a person, the amount A in micrograms remaining in that person after t hours is given by the equation $A(t) = 4e^{-0.046t}$. Round answers to 2 decimal places.

a. What amount of sodium-24 remains after 5 hours?

b. What is the half-life of sodium-24?

c. In how many hours will the amount of sodium-24 be 1 microgram?