

Directions: You may not use a calculator. The use of any other electronic devices are strictly prohibited. Show your work on ALL of the questions. Scratch paper is not allowed. You will not be allowed to leave to use the restroom.

Use $f(x) = x^4 + 10x^3 + 35x^2 + 50x + 24$ for questions 1 through 7.

1. (5 points) Find all the zeros of $f(x)$. What is the multiplicity of each root?

1. _____

2. (2 points) Write the complete factorization of $f(x)$ here.

2. _____

3. (2 points) What is the domain of $f(x)$?

3. _____

4. (2 points) Find the y -intercept of $f(x)$

4. _____

5. (2 points) Write an end behavior description for $f(x)$

5. _____

6. (2 points) Find the solution set to $f(x) > 0$

6. _____

7. (2 points) Find the solution set to $f(x) < 0$

7. _____

For questions 8 through 14, use $f(x) = \frac{x - 2}{x^2 - 17x - 18}$

8. (2 points) Find the vertical asymptote(s) of $f(x)$ 8. _____
9. (2 points) Find the domain of $f(x)$ 9. _____
10. (2 points) Find the x -intercept(s) of $f(x)$ 10. _____
11. (2 points) Find the y -intercept of $f(x)$ 11. _____
12. (2 points) Find the horizontal asymptote of $f(x)$ 12. _____
13. (2 points) Find all x values for which $f(x) > 0$ 13. _____
14. (2 points) Describe the behavior of the graph of f around its vertical asymptote(s). 14. _____

15. (4 points) Find the quotient and the remainder for $\frac{x^5 - 2x^3 + 2x + 1}{x^2 + 1}$

15. _____

16. (4 points) Find a polynomial with integer coefficients that satisfies the given conditions. The polynomial is degree 3 and has a zeros at $x = 1$, -2 , and that -2 is a zero with multiplicity of 2. Write the polynomial in descending order (leaving your polynomial in factored form doesn't constitute a full credit answer).

16. _____

Find a mathematical model for the verbal statement.

17. (2 points) y varies directly as the cube of x and inversely as the square of s .

17. _____

Find a mathematical model that represents the statement. Then determine the value of the constant of proportionality, k .

18. P varies directly as x and inversely as the square of y . It is known from experimental results that ($P = \frac{28}{3}$ when $x = 42$ and $y = 9$.)

18. _____