

Math 176 — **Quiz 9**

Name: _____

Directions: You may not use a calculator. The use of a computer or any other electronic devices are strictly prohibited. Show your work on ALL 33 questions (6 pages). This quiz is due at 5:30 pm (no exceptions—email the pdf) on Monday, October 7th.

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

1. _____

2. (3 points) Divide and simplify $\frac{2 + 3i}{3 - 5i}$. Write your solution in the form $a + bi$.

2. _____

3. (3 points) Solve $\ln(x + 5) = \ln(x - 1) - \ln(x + 1)$.

3. _____

For questions 4 through 9, use $f(x) = x^4 + 10x^3 + 35x^2 + 50x + 24$.

4. (3 points) Find all the zeros of $f(x)$ 4. _____

5. (1 point) What is the domain of $f(x)$? 5. _____

6. (1 point) Find the y -intercept of $f(x)$ 6. _____

7. (2 points) Write an end behavior description of $f(x)$

8. (2 points) Find the solution set to $f(x) < 0$ 8. _____

9. (2 points) Use synthetic division to find the value of $f(-5)$ 9. _____

For questions 10 through 16, use $f(x) = \frac{x^2 - 5x + 6}{3x^2 - 15x - 18}$

10. (2 points) Find the vertical asymptote(s) of $f(x)$ 10. _____

11. (1 point) Find the domain of $f(x)$ 11. _____

12. (2 points) Find the zeros of $f(x)$ 12. _____

13. (1 point) Find the y -intercept of $f(x)$ 13. _____

14. (2 points) Find the horizontal asymptote of $f(x)$ 14. _____

15. (4 points) Describe the behavior of the graph of f around its vertical asymptote(s).

16. (2 points) Describe the end behavior of the graph of f .

17. (3 points) Find a 2nd-degree polynomial function with integer coefficients that has a zero at $x = 2 + 5i$. Write the polynomial in descending order (leaving your polynomial in factored form doesn't constitute a full credit answer).

17. _____

For questions 18 through 23, use $f(x) = 2 - 3^{x+1}$

18. (2 points) Find the range of $f(x)$ 18. _____

19. (2 points) Find the horizontal asymptote(s) of $f(x)$ 19. _____

20. (1 point) Find the domain of $f(x)$ 20. _____

21. (2 points) Find the zero(s) of $f(x)$ if there are any. You can leave your answer(s) in exact form.

21. _____

22. (1 point) Find the y -intercept of $f(x)$ if there is one. 22. _____

23. (2 points) Describe the end behavior of the graph of f .

For questions 24 through 29, use $f(x) = 2 - \log_3(x + 1)$

24. (2 points) Find the range of $f(x)$ 24. _____

25. (2 points) Find the vertical asymptote(s) of $f(x)$ 25. _____

26. (1 point) Find the domain of $f(x)$ 26. _____

27. (2 points) Find the zero(s) of $f(x)$ if there are any. You can leave your answer(s) in exact form.

27. _____

28. (1 point) Find the y -intercept of $f(x)$ if there is one. 28. _____

29. (2 points) Describe the end behavior of the graph of f .

30. (2 points) Find the slant asymptote(s) of $f(x) = \frac{x^2 + 2x + 2}{x}$ 30. _____

31. (2 points) Write a statement describing the end behavior of $f(x) = \frac{x^2 + 2x + 2}{x}$ 31. _____

32. (2 points) Evaluate $\log_5(\sqrt[3]{5}) - \log_2\left(\frac{1}{8}\right)$ 32. _____

33. (3 points) The half-life of Plutonium-240 is 6537 years. If a sample has a mass of 130 kg, find a function that models the mass that remains after t years. (Hint: use the continuous growth/decay model $A = P_0e^{rt}$.)