

Pre-Calculus Final Review

Solve and graph the solution for each the following.

1. $|3x - 9| > 4$ 2. $|2x + 5| \leq 7$ 3. $\frac{2-x}{3} < \frac{3-2x}{5}$ 4. $(2x - 5)^2(x - 3)(x - 2) < 0$

Find the domain for each of the following.

5. $f(x) = \frac{1}{x+3}$ 6. $f(x) = \sqrt{2x+5}$ 7. $g(x) = \frac{1}{\sqrt{x^2+3x-28}}$

If $f(x) = 2x - 3$ and $g(x) = 1 - x^2$, find each of the following.

8. $f(x) - g(x)$ 9. $f(g(x))$ 10. $g(f(-2))$ 11. $f^{-1}(x)$

12. Find the formula for t_n for the sequence 8, 6, 4, 2, ...

13. Find the formula for t_n for the sequence 24, -12, 6, -3,

14. Find t_{101} in the arithmetic sequence in which $t_1 = 76$ and $t_3 = 70$.

15. Find t_7 in the geometric sequence in which $t_1 = 81$ and $t_2 = 54$.

16. How many terms are in the arithmetic sequence 178, 170, ..., 2?

17. How many four digit numbers are divisible by 10?

18. Find the fifth term of the sequence if $t_1 = -3$ and $t_n = 2(t_{n-1} + 1)$

19. Find S_{25} of the arithmetic series $17 + 25 + 33 + \dots$

20. Find S_{10} of the geometric series $2 - 6 + 18 - 54 + \dots$

21. Find the sum of the infinite geometric series $9 - 6 + 4 - \dots$

Find the following limits.

22. $\lim_{n \rightarrow \infty} \frac{2n^2 - 1}{5n^2}$

23. $\lim_{n \rightarrow \infty} \frac{n^2 + 5n - 1}{n^3 - 4n^2}$

24. $\lim_{n \rightarrow \infty} \frac{n^3 - 1}{n^2 + 3}$

25. $\lim_{n \rightarrow \infty} .9^n$

26. $\lim_{x \rightarrow -4} -5x + 6$

27. $\lim_{x \rightarrow 2} \frac{x - 2}{x^2 - 4}$

28. $\lim_{x \rightarrow 0} \frac{2 - \sqrt{4 - x}}{x}$

29. $\lim_{x \rightarrow -\frac{1}{2}} \frac{2x^2}{2x + 1}$

Find $f'(x)$ for each of the following. Use the theorems.

30. $f(x) = 6x^4 + 2x^3 - x^2 + 8$

31. $f(x) = \frac{7}{2}x^2 - 5x + 3 - \frac{1}{x}$

32. $f(x) = \sqrt[3]{x}$

33. If $f(x) = 12$, then $f'(x) = \underline{\hspace{2cm}}$ and $f''(x) = \underline{\hspace{2cm}}$. Describe what this means graphically.

34. Where is $f(x) = \frac{x^2 + 5x + 4}{x^2 - 4x + 3}$ discontinuous? What does this mean graphically?

35. Write the equation of a line tangent to $f(x) = 6x^2 + 2$ at $x = -1$.

36. Given $f(x) = \frac{3x^2 - 3}{x^2 + 4x - 5}$ find the following.

- State the discontinuities $\underline{\hspace{2cm}}$
- What type are the discontinuities? $\underline{\hspace{2cm}}$
- x-intercept(s) $\underline{\hspace{2cm}}$
- y-intercept $\underline{\hspace{2cm}}$
- coordinates of a hole (if there is one) $\underline{\hspace{2cm}}$
- vertical asymptote (if there is one) $\underline{\hspace{2cm}}$
- horizontal asymptote $\underline{\hspace{2cm}}$
- Sketch the graph

37. Use the definition of the derivative, $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$, to find $f'(x)$ of $f(x) = 2x^2 - x + 1$

For #38 – 39 find the following:

- a. Find the first derivative and the zeros of the first derivative.
- b. Plot these on the number line and test. List the intervals where the function is increasing or decreasing.
- c. Find the coordinates of any local maximum(s) or minimum(s).
- d. Find the second derivative and the zeros of the second derivative.
- e. Plot these on the number line and test. List the intervals where the function is concave up (CU) or concave down (CD).
- f. Find the coordinates for any point(s) of inflection.
- g. Plot the y-intercept
- h. Sketch the graph.

38. $f(x) = x^3 - 3x^2 + 1$

39. $f(x) = 3x^4 - 4x^3$

