Pre-Calculus Final I Part I Review Sheet

Do all work on loose leaf.

Simplify each of the following.

1. $(9x^3yz^2)^3$

2. $\dfrac{16x^5y^7z^4}{8x^{11}y^6z^2}$

3. $(x - 15)^2$

4. $(x - 3)(4x + 3)$

5. $\sqrt{54} + 3\sqrt{24}$

Find the value(s) of the variable for which the rational expression is not defined.

6. $\dfrac{4b}{b^2 + 5b}$

7. $\dfrac{z^2 + 10z}{z^2 - 7z + 10}$

Simplify.

8. $\dfrac{2y + 4}{3y + 6}$

9. $\dfrac{3x + 15}{x^2 + 7x + 10}$

Simplify each complex fraction.

10. $\dfrac{\frac{3}{a^2} + \frac{5}{a^3}}{\frac{10}{a} + 6}$

11. $\dfrac{\frac{a}{b} - \frac{b}{a}}{1 - \frac{b}{a}}$

12. $\dfrac{\frac{1}{x} + \frac{1}{2x+1}}{\frac{4x}{2x+1}}$

Determine the domain.

13. $f(x) = \dfrac{6}{2x + 18}$

14. $y = \sqrt{8x + 16}$

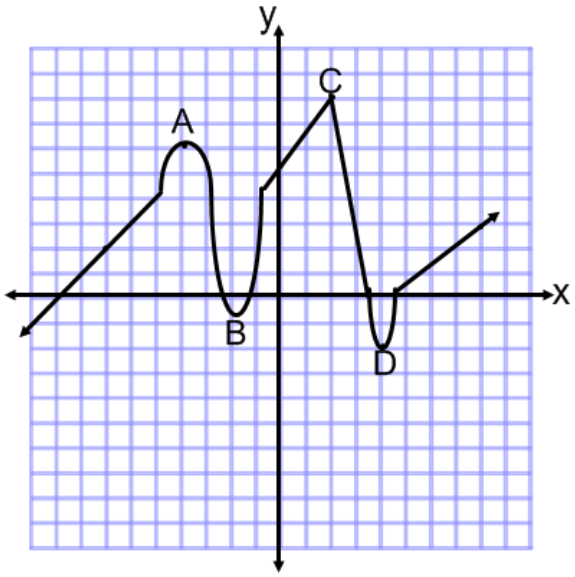
15.

a) Evaluate: f(-4)

f(2)

For how many values does f(x)=4

b) What is the domain and range of this graph?




c) Is this a function? How do you know?

d) State the intervals where the function is:

Increasing:

Decreasing:

Constant:

e) State the relative maxima.

f) State the relative minima.

Algebraically, determine if each of the following is even, odd, or neither. Then, identify any known symmetries.

16. $f(x) = x^3 + x^2$

17. $f(x) = 4x^2 - x^4$

18. $f(x) = -6x^5 + 3x^2$

If $f(x) = 4x + 3$ and $g(x) = x^2 + 3x$, evaluate each of the following.

19. f(g(4))

20. g(f(-2))

21. g(f(x))

22. $(f \circ g)(x)$

Find an equation for the inverse of each of the following.

23. $f(x) = 3x + 5$

24. $y = \frac{1}{2}x - 6$

25. $f(x) = \frac{x+6}{3}$

26. $y = \sqrt{5x+7}$

Perform the indicated operation.

27. $(5 + 6i) + (3 - 4i)$ 28. $(5 - 3i) - (6 - 2i)$

29. $(3 + 2i)(2 + i)$ 30. $(5 + 2i)(5 - 2i)$

Solve each of the following.

31. $x^2 - 4x - 5 < 0$ 32. $x^2 \geq 7x - 10$ 33. $x^2 - 2x > 0$

34. In a factory, the profit, P, varies directly with the inventory, I. If P = 100 when I = 20, find P when I = 50.

35. Variable T varies directly with the square of m. If T is 8 when m = 2, find T when m = 4.

Use the Rational Zero Theorem to list all possible rational zeros for each given function.

36. $f(x) = x^4 - 6x^3 + 14x^2 - 14x + 5$ 37. $f(x) = 3x^5 - 2x^4 - 15x^3 + 10x^2 + 12x - 8$

38. $2000 is deposited into an account that earns 6% annual interest, compounded monthly. Find the balance after 10 years.

Write the exponential equation in logarithmic form.

39. $3^4 = 81$ 40. $9^{\frac{3}{2}} = 27$ 41. $a^b = 12$ 42. $16^{\frac{-1}{2}} = \frac{1}{4}$ 43. $m^n = p$

Write the logarithmic equation in exponential form.

44. $\log_3 9 = 2$ 45. $\log_5 25 = \frac{1}{2}$ 46. $\log_x y = 4$

47. $\log_{11} \sqrt{11} = \frac{1}{2}$ 48. $\log_a b = c$

Use the laws of logarithms to expand each expression.

49. $\log_3 mn$

50. $\log_4 a^3 b$

51. $\log_7 \sqrt{x}y$

52. $\log_3 \dfrac{\sqrt{m}}{n}$

53. $\log_2 \dfrac{x^5}{y^3}$

54. $\log a^3 b\sqrt{c}$

Use the laws of logarithms to rewrite as a single logarithm.

55. $2\log a + 3\log b$

56. $\log a - 3\log b$

57. $\dfrac{1}{3}\log a - 6\log b$

58. $\log a + 4\log b - 2\log c$

Solve each equation.

59. $\log_3 x = 2$

60. $\log_{16}(3x+1) = \dfrac{1}{2}$

61. $\log_{\frac{1}{3}}(4x+7) = -2$

62. $\log_3(2y-3) = \log_3(y+6)$

63. $\log_5(x^2-2) = \log_5(10x-18)$

ANSWER KEY

1. $729x^9y^3z^6$ 2. $\frac{2yz^2}{x^6}$ 3. $x^2 - 30x + 225$

4. $4x^2 - 9x - 9$ 5. $9\sqrt{6}$

6. b = 0 or b = -5 7. z = 5 or z = 2 8. $\frac{2}{3}$

9. $\frac{3}{x+2}$ 10. $\frac{1}{2a^2}$ 11. $\frac{a+b}{b}$ 12. $\frac{3x+1}{4x^2}$

13. $\{x|x \neq -9\}$ 14. $\{x|x \geq -2\}$

15. a) f(-4)=6 f(2)=8 f(x)=4 for 4 x-values
b) Domain: {x} Range: {y} c) function because no x-values repeat
d) Increasing: $(-\infty,-4)$, (-2,2), $(4,\infty)$ Decreasing: (-4,-2), (2,4) Constant: ---
e) Relative Maxima: (-4,6), (2,8) f) Relative Minima: (-2,-1), (4,-2)

16. Neither 17. Even,symmetric to y-axis 18. Neither

19. 115 20. 10

21. $16x^2 + 36x + 18$ 22. $4x^2 + 12x + 3$

23. $f^{-1}(x) = \frac{x-5}{3}$ 24. $y^{-1} = 2x + 12$ 25. $f^{-1}(x) = 3x - 6$

26. $y^{-1} = \frac{x^2 - 7}{5}$

27. 8 + 2i 28. -1 - *i* 29. 4 + 7i 30. 29

31. {x| -1 < x < 5} 32. {x| x ≤ 2 or x ≥ 5} 33. {x| x < 0 or x > 2}

34. 250 35. 32

36. ±1, ±5 37. ±1, ±2, ±4, ±8, $\pm\frac{1}{3}$, $\pm\frac{2}{3}$, $\pm\frac{4}{3}$, $\pm\frac{8}{3}$

38. $3638.79

39. $4 = \log_3 81$

40. $\frac{3}{2} = \log_9 27$

41. $b = \log_a 12$

42. $\frac{-1}{2} = \log_{16} \frac{1}{4}$

43. $n = \log_m p$

44. $3^2 = 9$

45. $5^{\frac{1}{2}} = 25$

46. $x^4 = y$

47. $11^{\frac{1}{2}} = \sqrt{11}$

48. $a^c = b$

49. $\log_3 m + \log_3 n$

50. $3\log_4 a + \log_4 b$

51. $\frac{1}{2}\log_7 x + \log_7 y$

52. $\frac{1}{2}\log_3 m - \log_3 n$

53. $5\log_2 x - 3\log_2 y$

54. $3\log a + \log b + \frac{1}{2}\log c$

55. $\log a^2 b^3$

56. $\log \frac{a}{b^3}$

57. $\log \frac{\sqrt[3]{a}}{b^6}$

58. $\log \frac{ab^4}{c^2}$

59. $x = 9$

60. $x = 1$

61. $x = \frac{1}{2}$

62. $y = 9$

63. $x = 8$ or $x = 2$