CHAT Pre-Calculus – First Semester Extra Credit

First Semester Review

Instructions: Complete the following problems. You can either do the problems on separate paper and circle your answers, or you can do the work on separate paper and put your answers on the worksheets themselves. Either way, you must show your work to receive credit.

Note: This is an open book activity. You can use your notes and your textbook.

Extra Credit Amount:

        5 points for scores of 50% - 60%

        8 points for scores of 61% - 84%

        10 points for scores of 85% - 100%

Non-Calculator

For the following:
(a) Identify the parent
(b) State the transformation rule(s).

1. $f(x) = \dfrac{1}{x+2} - 3$

a) $f(x) = \dfrac{1}{x}$

b) shift 2 units left + 3 units down

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

a) _____

b) _____

3. $f(x) = -2(x+1)^2 + 4$

a) _____

b) _____

Vertex: _____

Axis of symmetry: _____

4. $f(x) = x^2 + 8x + 11$

a) _____

b) _____

Vertex: _____

Axis of symmetry: _____

5. $f(x) = \log(x-2)$

a) _____

b) _____

6. $f(x) = \ln(x-1) - 3$

a) _____

b) _____

7. $f(x) = 3^{x+2}$

a) _____

b) _____

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Solve. Check for extraneous roots.

8. $2(5 - 2y) - 3(1 - y) \geq y + 1$

9. $\dfrac{x-2}{3} + \dfrac{x+5}{2} = \dfrac{1}{3}$

10. $|2x - 5| > 4.2$

11. $|-x + 4| - 3 \leq 7$

12. $\dfrac{3x}{x+1} + \dfrac{5}{x-2} = \dfrac{15}{x^2 - x - 2}$

13. $4x^2 - 7x + 5 = 0$

14. $-3 \leq 1 - 2x < 7$

15. $\dfrac{(2x+1)}{(x+3)(x-1)} \leq 0$

Hint: You are looking for a <u>negative</u> quotient.

16. $x^3 - 2x^2 + x \geq 0$

17. $\dfrac{2}{x+1} - \dfrac{3}{x-5} > 0$

Hint: Combine fractions using a common denominator, then proceed like in #15.

Simplify. Express your answer without negative exponents.

18. $\dfrac{\left(uv^{-2}\right)^{-3}}{u^{-5}v^2}$

19. $\dfrac{4a^3b}{a^2b^3}\cdot\dfrac{3b^2}{2a^2b^4}$

20. Write a general form equation of a line a) parallel to and b) perpendicular to $5x - y = 7$ and passing through the point $(3, -4)$.

a)

b)

Find the domain.

21. $f(x) = \sqrt{x^2 + 3}$

22. $f(x) = \dfrac{\sqrt{x}}{x - 5}$

Prove algebraically whether the function is even, odd, or neither.

23. $f(x) = 3x^3 - 2x$

24. $f(x) = -2x^4 - 4x + 7$

Given $f(x) = (x - 4)^2$, $g(x) = 2x - 3$ and $h(x) = \sqrt{x + 5}$ Find and simplify the answer.

25. $f \circ h(4)$

26. $g(f(x))$

27. $f + g$

28. fg

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29. Given: $f(x) = x^3 + 2$. Find $f^{-1}(x)$.

30. **Prove** that f and g are inverses of each other by showing $f(g(x)) = x$ and $g(f(x)) = x$

$f(x) = 2x + 8 \qquad g(x) = \dfrac{x-8}{2}$

Describe the right and left hand behavior of each graph.

31. $f(x) = -2x^3 + 4x^2 + 1$
32. $f(x) = 3x^4 + x^2 - 5$

Find the zeros of the function algebraically.

33. $f(x) = 3x^2 + 2x - 5$
34. $f(x) = x^3 - 36x$

Find the zeros of the function and write the function as a product of linear and irreducible quadratic factors all with real coefficients. List real and complex zeros.

35. $f(x) = x^3 - x^2 - x - 2$, given that $x = 2$ is one zero.

36. $f(x) = x^4 + 3x^3 - 3x^2 + 3x - 4$, given that $x = 1$ and $x = -4$ are both zeros.

Find (if it exists) the a) asymptotes b) intercepts and c) domain of the function. Sketch the graph by hand.

37. $g(x) = \dfrac{4x - 5}{x - 3}$

38. $g(x) = \dfrac{2x^2}{x^2 - x - 6}$

39. Simplify

a) $\log_{11} 11^4$

b) $\log_5 1$

c) $\ln \dfrac{1}{e}$

d) $\log \sqrt[4]{10}$

e) $\log_9 \dfrac{1}{27}$

f) $3^{\log_3 7}$

Graphing Calculator

Solve by graphing. Use a graphing calculator.

40. $3x - 2 = \sqrt{x + 4}$

41. $0 = x^3 + x^2 - 5x + 3$

42. Find all a) local maxima and minima and b) identify intervals on which the function is increasing, decreasing, or constant.

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

Graph the function

43. $f(x) = \dfrac{|x|}{x}$

44. $h(x) = \dfrac{x^2 + x}{x}$

Sketch the graph of the piecewise-defined function. State whether the function is continuous or discontinuous at $x = 0$.

45. $f(x) = \begin{cases} x & \text{if } x \le 0 \\ x^2 & \text{if } x > 0 \end{cases}$

46. $f(x) = \begin{cases} -|x| & \text{if } x < 0 \\ 2 & \text{if } x \ge 0 \end{cases}$

47. Sue invested $10,000, part at 3.6% annual interest and the balance 7.8% annual interest. How much is invested at each rate if a 1-year interest payment is $667.02?

49. The chemistry lab at the University of Hardwoods keeps two acid solutions on hand. One is 20% acid and the other is 35% acid. How much 20% acid solution and how much 35% acid solution should be used to prepare 25 liters of a 26% acid solution?

50. Write an equation for the linear function f with $f(-3) = -2$ and $f(4) = -8$.
    Express your answer in slope – intercept form.

52. The table below gives the weight and pulse rate of selected mammals.
    a) Write a linear regression equation. (Round values to the nearest tenth.)

Mammal	Body Weight	Pulse Rate (beats/min)
Rat	0.2	420
Guinea Pig	0.3	300
Rabbit	2	205
Small Dog	5	120
Large Dog	30	85
Sheep	50	70
Human	70	72

b) Use the regression equation to determine the pulse rate of a human weighing 12 pounds.

Divide.

53. $2x + 1$; $6x^3 - 5x^2 + 9$

54. $x - 5$; $x^3 - 4x^2 - 7x + 10$

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Find a polynomial equation with the given zeros. Express answers in standard form.

55. $\frac{1}{3}, -2, 5$

56. a) $-1, 2 - i$ b) $3, 4i$

57. Write in $a + bi$ form: $\dfrac{2 + 4i}{3 - 2i}$

58. Shan invested $100 at 3.5% interest compounded monthly. How long will it take for her investment to double? Solve algebraically and graphically.

60. Find the amount accumulated after investing a principal of $3000 for 3 years at an interest rate of 6.5% compounded continuously.

61. Rewrite the expression as a sum or difference of multiple logarithms.

   a) $\log_3(a^2b)$ b) $\log_3 \dfrac{\sqrt{a}}{bc}$

62. Express as a single logarithm. Simplify.

   a) $2\log r - \log q + 3\log w$ b) $\dfrac{1}{3}\log 27 - 2\log 4$

Solve. NOTE: DO NOT use your calculator for 64, 66-68!

63. $2(5)^x = 26$ 64. $\log x = -2$

65. $2e^x = 3.4$ 66. $\log_3(2 - 3x) + 5 = 9$

67. $\log(x^2 + 21x) = 2$ 68. $\log_2(x - 1) - \log_2(2x + 3) = 3$