

CHAT Pre-Calculus – First Semester Extra Credit

Pre-Calc Semester Review

Instructions: You only need to print the answer sheet. The actual packet can be viewed on your computer, if desired, or it can be printed. All that will be handed in is the answer sheet.

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

Extra Credit Amount:

5 points for scores of 50% - 60%

8 points for scores of 61% - 84%

10 points for scores of 85% - 100%

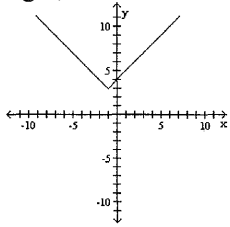
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| 18 . _____ | 36 . _____ | 54 . _____ |

Extra Credit

CHAT PRECALCULUS SEMESTER 1 REVIEW

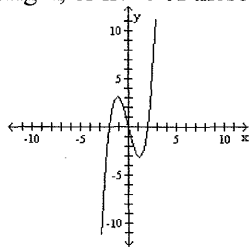
Name _____

1. List the intercepts of the graph. Tell whether the graph is symmetric with respect to the x-axis, y-axis, origin, or none of these.



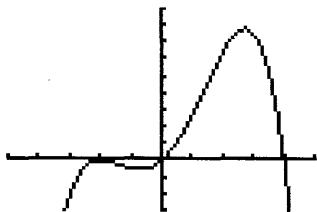
- intercept: (4, 0) no symmetry
- intercept: (0, 4) symmetric with respect to x-axis
- intercept: (4, 0) symmetric with respect to y-axis
- intercept: (0, 4) no symmetry

2. List the intercepts of the graph. Tell whether the graph is symmetric with respect to the x-axis, y-axis, origin, or none of these.



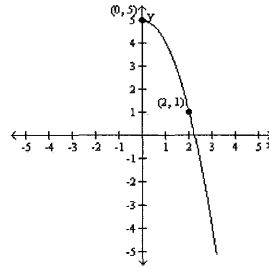
- intercepts: (-2, 0), (0, 0), (2, 0)
symmetric with respect to x-axis, y-axis, and origin
- intercepts: (-2, 0), (0, 0), (2, 0)
symmetric with respect to y-axis
- intercepts: (-2, 0), (0, 0), (2, 0)
symmetric with respect to x-axis
- intercepts: (-2, 0), (0, 0), (2, 0)
symmetric with respect to origin

3. Give a POSSIBLE equation for the following polynomial function

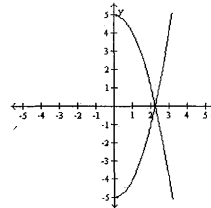


4. Draw a complete graph so that it has the given type of symmetry.

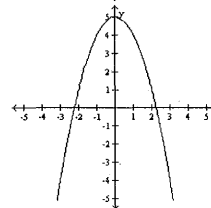
Symmetric with respect to the y-axis



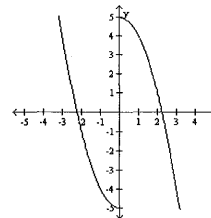
a.



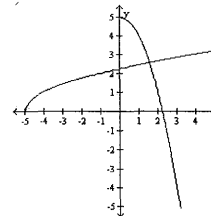
b.



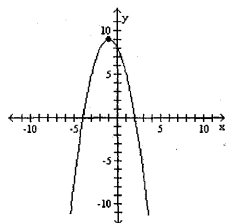
c.



d.



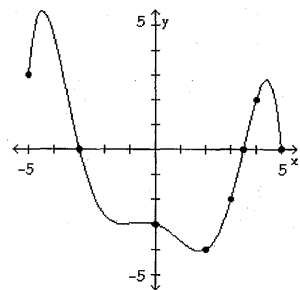
5. Determine whether the graph is that of a function. If it is, use the graph to find its domain and range, the intercepts, if any, and any symmetry with respect to the x-axis, the y-axis, or the origin.



- a. function
 domain: $\{x|x \leq 9\}$
 range: all real numbers
 intercepts: $(-4, 0)$, $(0, 8)$, $(2, 0)$
 symmetry: y-axis
- b. not a function
- c. function
 domain: all real numbers
 range: $\{y|y \leq 9\}$
 intercepts: $(0, -4)$, $(8, 0)$, $(0, 2)$
 symmetry: none
- d. function
 domain: all real numbers
 range: $\{y|y \leq 9\}$
 intercepts: $(-4, 0)$, $(0, 8)$, $(2, 0)$
 symmetry: none

6. The graph of a function f is given. Use the graph to answer the question.

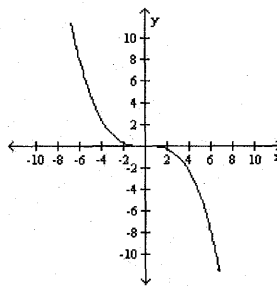
For what numbers x is $f(x) = 0$?



- a. -3, 3.5, 5 b. $(-5, -3)$, $(3.5, 5)$
 c. $(-3, 3.5)$ d. -3

7. Write a third degree equation that contains the roots -2 and $-5i$.

8. The graph of a function is given. Decide whether it is even, odd, or neither.



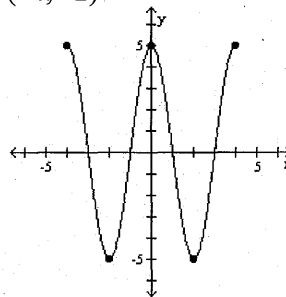
- a. neither b. odd c. even

9. Determine algebraically whether the function $f(x) = -5x^2 - 4$ is even, odd, or neither.

- a. even b. odd c. neither

10. The graph of a function is given. Determine whether the function is increasing, decreasing, or constant on the given interval.

$(-4, -2)$



- a. decreasing b. increasing c. constant

11. Find the inverse of $f(x) = 3x - 7$

12. If $f(x) = 3x + 5$ and $g(x) = x^2 + 5$, find $f(g(x))$ and $g(f(x))$.

13. Use a graphing utility to graph the function over the indicated interval and approximate any local maxima and local minima. Determine where the function is increasing and where it is decreasing. If necessary, round answers to two decimal places.

$$f(x) = x^3 - 3x^2 + 5, (-2, 3)$$

- local maximum at 1
local minimum at 5
increasing on $(-2, -1)$
decreasing on $(-1, 0)$
- local maximum at 5
local minimum at 1
increasing on $(-2, 0)$ and $(2, 3)$
decreasing on $(0, 2)$
- local maximum at 5
local minimum at 1
increasing on $(0, 1)$
decreasing on $(-2, 0)$ and $(1, 3)$
- local maximum at 1
local minimum at 5
increasing on $(-2, -1)$ and $(1, 3)$
decreasing on $(-1, 1)$

14. Find ALL asymptotes.

$$y = \frac{x^2 - x - 6}{x - 7}$$

15. Solve $y = 3 + \ln x = x^2 + 4x - 5$ using a graphing calculator. Round your answer to the nearest tenth.

16. Find ALL intercepts.

$$f(x) = \frac{(x+3)(x-6)}{(x-2)(x-3)}$$

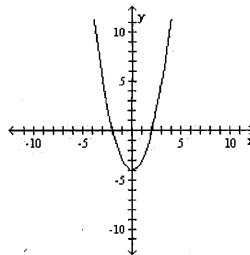
17. Solve algebraically.

$$3 = \log_2(x) + \log_2(x+2)$$

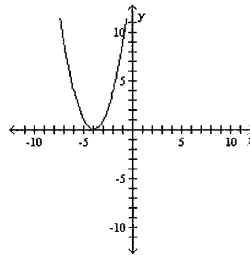
18. Graph the function by starting with the graph of the basic function and then using the techniques of shifting, compressing, stretching, and/or reflecting.

$$f(x) = x^2 + 4$$

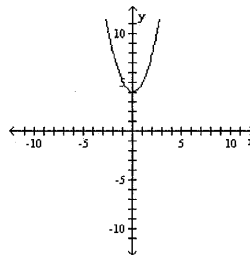
a.



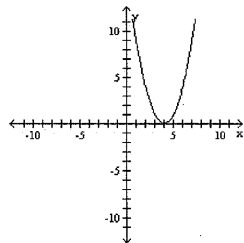
b.



c.



d.

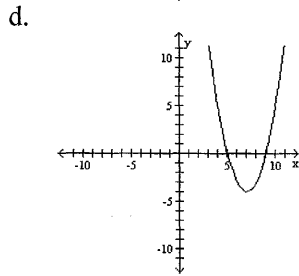
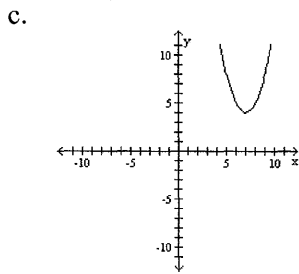
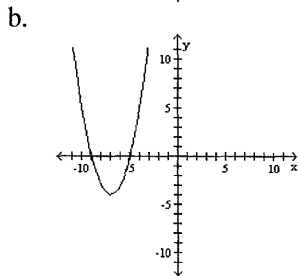
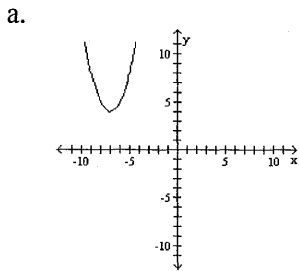


$$19. \text{ If } f(x) = \begin{cases} 2x+5 & x \leq -4 \\ x^2+1 & -4 < x \leq 1 \\ 3x-10 & x > 1 \end{cases}$$

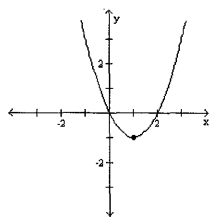
Find $f(-4)$

20. Graph the function by starting with the graph of the basic function and then using the techniques of shifting, compressing, stretching, and/or reflecting.

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



21. Match the graph to one of the listed functions.

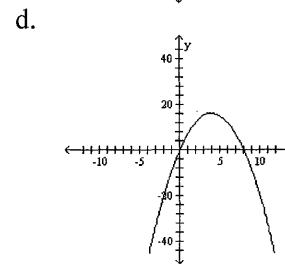
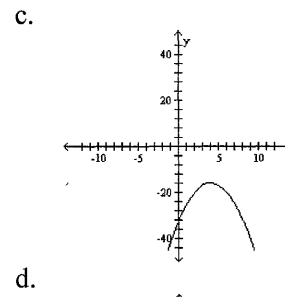
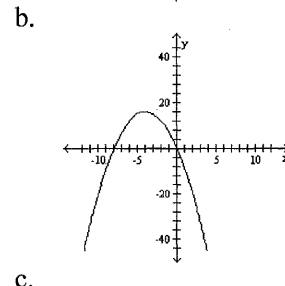
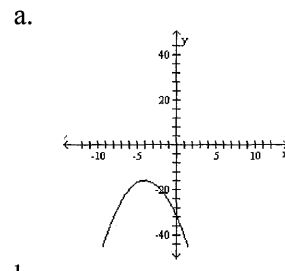


- a. $f(x) = x^2 - 2x$ b. $f(x) = x^2 + 2x$
 c. $f(x) = x^2 + 2x - 1$ d. $f(x) = x^2 - 2x - 1$

22. Graph the function f by starting with the graph of

$y = x^2$ and using transformations (shifting, compressing, stretching, and/or reflection).

$$f(x) = -x^2 - 8x$$



23. Determine the domain and the range of the function

$$f(x) = -x^2 - 10x$$

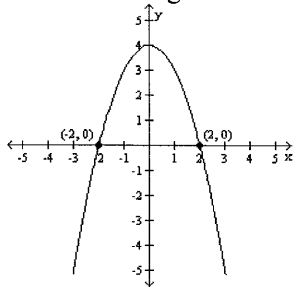
- a. domain: $\{x|x \leq -5\}$
 range: $\{y|y \leq 25\}$
 b. domain: all real numbers
 range: $\{y|y \leq 25\}$
 c. domain: $\{x|x \leq 5\}$
 range: $\{y|y \leq 25\}$
 d. domain: all real numbers
 range: $\{y|y \leq -25\}$

24. Determine, without graphing, whether the given quadratic function has a maximum value or a minimum value and then find that value.

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

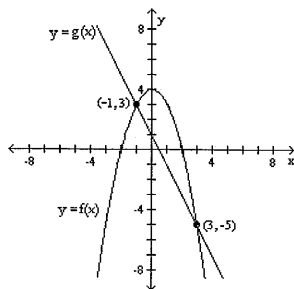
- a. minimum; $-\frac{9}{2}$ b. maximum; $\frac{9}{2}$
 c. minimum; $\frac{9}{2}$ d. maximum; $-\frac{9}{2}$

25. Use the figure to solve the inequality $g(x) \leq 0$



- a. $\{x | -2 < x < 2\}; (-2, 2)$
 b. $\{x | x < -2 \text{ or } x > 2\}; (-\infty, -2) \text{ or } (2, \infty)$
 c. $\{x | -2 \leq x \leq 2\}; [-2, 2]$
 d. $\{x | x \leq -2 \text{ or } x \geq 2\}; (-\infty, -2] \text{ or } [2, \infty)$

26. Use the figure to solve the inequality.



$$f(x) < g(x)$$

- a. $\{x | -1 < x < 3\}; (-1, 3)$
 b. $\{x | x \leq -1 \text{ or } x \geq 3\}; (-\infty, -1] \text{ or } [3, \infty)$
 c. $\{x | -1 \leq x \leq 3\}; [-1, 3]$
 d. $\{x | x < -1 \text{ or } x > 3\}; (-\infty, -1) \text{ or } (3, \infty)$

27. Solve the inequality.

$$x^2 - 9x \leq 0$$

- a. $\{x | x \leq 0 \text{ or } x \geq 9\}; (-\infty, 0] \text{ or } [9, \infty)$
 b. $\{x | x \leq -9 \text{ or } x \geq 0\}; (-\infty, -9] \text{ or } [0, \infty)$
 c. $\{x | -9 \leq x \leq 0\}; [-9, 0]$
 d. $\{x | 0 \leq x \leq 9\}; [0, 9]$

28. Solve the inequality. $x^2 - 16 \leq 0$

- a. $[-16, 16]$
 b. $\{x | x \leq -4 \text{ or } x \geq 4\}; (-\infty, -4] \text{ or } [4, \infty)$
 c. $(-\infty, -16] \text{ or } [16, \infty)$
 d. $\{x | -4 \leq x \leq 4\}; [-4, 4]$

29. Form a polynomial with zeros: -1, 1, -6 and degree 3

- a. $f(x) = x^3 - 6x^2 - x + 6$
 b. $f(x) = x^3 - 6x^2 + x - 6$
 c. $f(x) = x^3 + 6x^2 - x - 6$
 d. $f(x) = x^3 + 6x^2 + x + 6$

30. Form a polynomial with zeros: 3, multiplicity 2; -3, multiplicity 2; and degree 4

- a. $f(x) = x^4 + 18x^2 + 81$
 b. $f(x) = x^4 - 6x^3 + 18x^2 - 27x + 81$
 c. $f(x) = x^4 - 18x^2 + 81$
 d. $f(x) = x^4 + 6x^3 - 18x^2 + 27x - 81$

31. (calc) Find all local maximums and minimums for the polynomial $f(x) = x^4 + 3x^3 - 2x - 5$ (use calculator)

32. A life insurance company uses the following rate table for annual premiums for women for term life insurance. Use a graphing utility to fit an exponential function to the data. Predict the annual premium for a woman aged 70 years. (Use ExpReg)

Age	35	40	45	50	55	60	65
Premium	\$103	\$133	\$190	\$255	\$360	\$503	\$818

- a. $y = 0.0000398x^{4.06}$, \$1233 c. $y = 8.94e^{0.068x}$, \$1044
 b. $y = 6.367e^{0.068x}$, \$743 d. $y = -9306.4 + 2516.3 \ln(x)$, \$1723

Use regression equation to find y when $x=70$. Pick the answer above that has the closest dollar amount.

33. After introducing an inhibitor into a culture of luminescent bacteria, a scientist monitors the luminosity produced by the culture. Use a graphing utility to fit a logarithmic function to the data. Predict the luminosity after 20 hours. (Use LnReg)

Time, hrs	2	3	4	5	8	10	15
Luminosity	77.4	60.8	54.5	45.8	30.0	24.3	10.5

- a. $y = 112.97 - 45.97 \ln(x)$, c. $y = 100.5 - 32.7 \ln(x)$,
 -24.74 2.54
 b. $y = 107.55 - 41 \ln(x)$, d. $y = 98.75 - 32.66 \ln(x)$,
 -15.27 0.91

34. Solve the equation $e^{x+5} = 7$
 a. $\{\ln 12\}$ c. $\{e^7 + 5\}$
 b. $\{e^{35}\}$ d. $\{\ln 7 - 5\}$

35. Solve the equation $\log_3 x + \log_3(x - 24) = 4$
 a. $\{53\}$ c. \emptyset
 b. $\{-3, 27\}$ d. $\{27\}$

36. How long will it take for an investment to double in value if it earns 5.75% compounded continuously?
 a. 6.027 yr c. 12.055 yr
 b. 19.106 yr d. 12.811 yr

37. According to the Remainder Theorem, what is the remainder when the polynomial $f(x) = 3x^2 - 4x + 8$ is divided by $x-3$?

38. Write the equation, in vertex form, for a parabola that passes through the origin and whose vertex is at $(1, 2)$.

39. The logistic growth model $P(t) = \frac{990}{1 + 23.75e^{-0.331t}}$

represents the population of a bacterium in a culture tube after t hours. When will the amount of bacteria be 630?

- a. 11.26 hr c. 2.16 hr
 b. 5.22 hr d. 8.2 hr

40. For the polynomial $f(x) = 4(x - 7)(x - 5)^4$, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x -axis at each x -intercept.

- a. -7, multiplicity 1, crosses x -axis; -5, multiplicity 4, touches x -axis
 b. -7, multiplicity 1, touches x -axis; -5, multiplicity 4, crosses x -axis
 c. 7, multiplicity 1, touches x -axis; 5, multiplicity 4, crosses x -axis
 d. 7, multiplicity 1, crosses x -axis; 5, multiplicity 4, touches x -axis

41. Find the x - and y -intercepts of $f(x) = (x + 2)(x - 5)(x + 5)$
 a. x -intercepts: -2, -5, 5; y -intercept: -50
 b. x -intercepts: -5, 5, 2; y -intercept: -50
 c. x -intercepts: -5, 5, 2; y -intercept: 50
 d. x -intercepts: -2, -5, 5; y -intercept: 50

42. Find the domain of the rational function $G(x) = \frac{4x}{(x + 5)(x - 6)}$

- a. $\{x \mid x \neq 5, x \neq -6\}$ b. all real numbers
 c. $\{x \mid x \neq -5, x \neq 6, x \neq -4\}$ d. $\{x \mid x \neq -5, x \neq 6\}$

43. Find the vertical asymptotes of the rational function

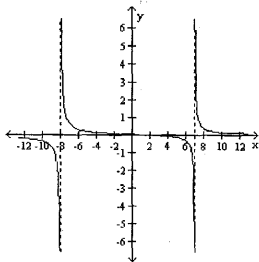
$$R(x) = \frac{x + 8}{x^2 - 36}$$

- a. $x = 0, x = 36$ b. $x = 36, x = -8$
 c. $x = -6, x = 6, x = -8$ d. $x = -6, x = 6$

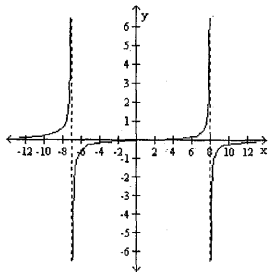
44. Graph the function.

$$f(x) = \frac{x - 2}{x^2 - x - 56}$$

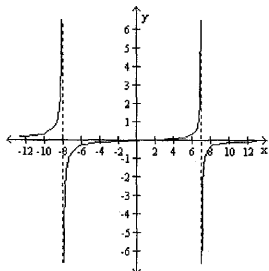
a.



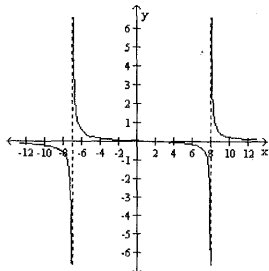
b.



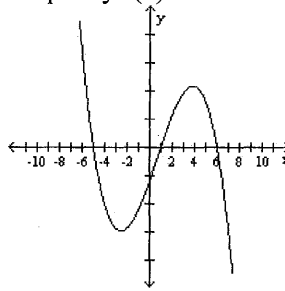
c.



d.



45. Use the graph of the function f to solve the inequality $f(x) < 0$



- a. $(-5, 1) \cup (6, \infty)$ b. $(-\infty, -5) \cup (1, 6)$
 c. $[-5, 1] \cup [6, \infty)$ d. $(6, \infty)$

46. Solve the inequality $(x + 7)(x + 6)(x - 6) > 0$ algebraically. Express the solution in interval notation.

- a. $(-\infty, -7) \cup (-6, 6)$ b. $(-7, -6) \cup (6, \infty)$
 c. $(6, \infty)$ d. $(-\infty, -6)$

47. For the given functions f and g , find $(g \circ f)(4)$.

$$f(x) = 4x + 6, \quad g(x) = 4x^2 + 1$$

- a. 16,901 b. 1937
 c. 266 d. 94

48. Solve: $2 \log_8 x + \log_8 100 = 0$

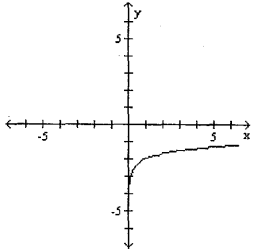
49. Solve: $5 = 8e^{x-4}$

50. Solve: $2^{x^2+3} = 16^x$

51. Solve the equation. $64^{x-3} = 8^{4x}$

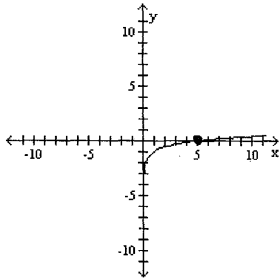
- a. $\{-3\}$ b. $\{-18\}$ c. $\{-1\}$ d. $\left\{-\frac{1}{2}\right\}$

52. The graph of a logarithmic function is shown. Select the function which matches the graph.



- a. $y = \log x - 2$ b. $y = 2 - \log x$
 c. $y = \log(x - 2)$ d. $y = \log(2 - x)$

53. The graph of a logarithmic function is shown. Select the function which matches the graph.

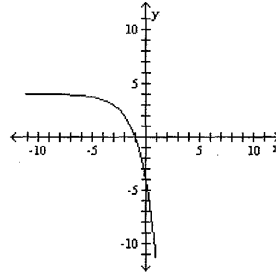


- a. $y = \log_5 x$ b. $y = \log_5(x - 1)$
 c. $y = \log_5(x + 1)$ d. $y = \log_5 x - 1$

54. Use transformations to graph the function. Determine the domain, range, and horizontal asymptote of the function.

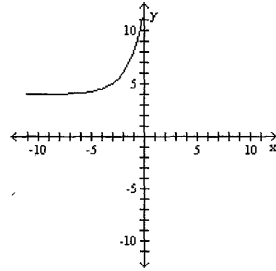
$$f(x) = -2^{x+3} + 4$$

a.



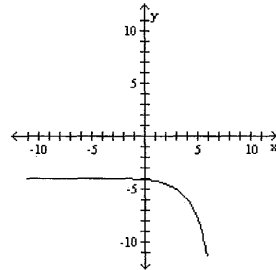
domain of f : $(-\infty, \infty)$; range of f : $(-\infty, 4)$;
 horizontal asymptote: $y = 4$

b.



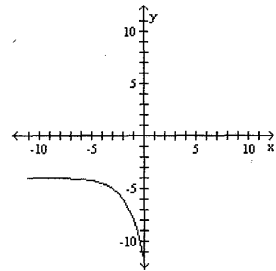
domain of f : $(-\infty, \infty)$; range of f : $(-4, \infty)$;
 horizontal asymptote: $y = 4$

c.



domain of f : $(-\infty, \infty)$; range of f : $(-\infty, -4)$;
 horizontal asymptote: $y = -4$

d.



domain of f : $(-\infty, \infty)$; range of f : $(-\infty, -4)$;
 horizontal asymptote: $y = -4$