Pre-Calculus: Fall Semester Final Exam Review
Do all work on a separate piece of paper. NO CALCULATORS!

Name _____

1. Find an equation of the line that:
   a) goes through the points (2, 5) and (6, 18)
   b) is parallel to $3x + 6y = 8$ and goes through (9, 12)
   c) is perpendicular to $2x – y = 5$ and goes through (4, 10)

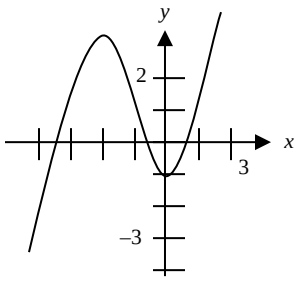
2. The number of rats in the lunch area grows in a linear fashion and was 120 on day 1 and 600 on day 49. Predict the number of rats in the lunch area on day 60.

3. Which function represents y as a function of x? parabola, circle, sideways parabola, absolute value of x, absolute value of y.

4. Given $f(x) = 2x^2 + 9$, find $f(3) – f(6)$

5. Find the range of each function:
   a) $y = x^2 + 4$
   b) $y = –| x + 3 | – 1$
   c) $y = \sqrt{x-2}$

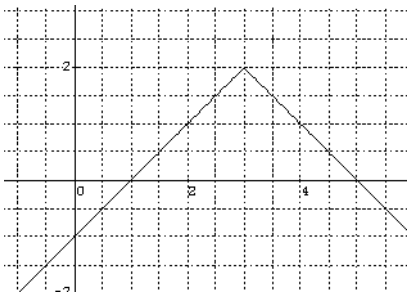
6. Determine the intervals over which the function is increasing.



Problem 7.

7. Given $f(x) = 4 – 2x^2$ and $g(x) = 2 – x$, find $(f \circ g)(x)$.

8. The graph at the right is a transformation of the graph of $f(x) = | x |$. Find an equation for the function.



9. Write in the form $y = a(x-h)^2 + k$: $f(x) = 2x^2 + 16x + 9$

10. Determine the end behavior: $y = –3x^3 + 2x^2 – 4x + 5$

11. $(6x^3 + 7x^2 – 15x + 6) \div (x – 1)$

12. Write in standard form: $\left(4 – \sqrt{25}\right) + 2\sqrt{-9} – 4i + 7$

13. Write as a product of linear factors: $f(x) = x^4 + 6x^2 – 27$

14. Graph a) $y = 2^x + 1$ b) $y = 4^{x-3}$ c) $y = 2 + \log(x+1)$

15. Write in exponential form: $\log_b 16 = 2$

16. Write in logarithmic form: $8^3 = 512$

17. Solve: $\log(3x + 7) + \log(x – 2) = 1$

18. The growth of a certain fungus, g(x), over t hours is modeled by the equation $g(x) = \frac{550}{1+449e^{-0.8t}}$.

a) In how many hours will there be 800 fungi?
b) Determine the number of fungi after 10 hours.

19. Find the domain, intercepts, vertical, and horizontal asymptotes of each function and graph.

a. $f(x) = \frac{x+2}{x^2-3x+2}$ b. $f(x) = \frac{3x-2}{x+2}$

20. For the polynomial: $3x^4 - 4x^3 + 4x^2 - 4x + 1 = 0$
    a. find the real zeros
    b. find all real and complex zeros

21. There are 9 different kinds of cookies on the table. You may choose 4 of them. How many possible combinations of cookies could you choose?

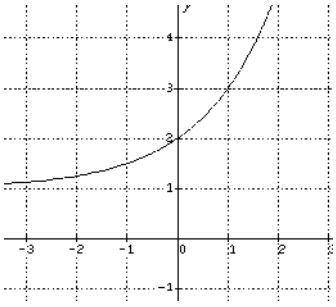
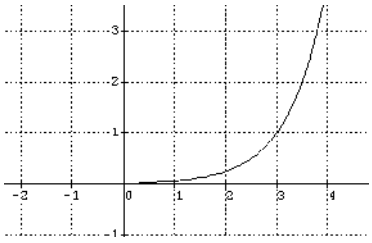
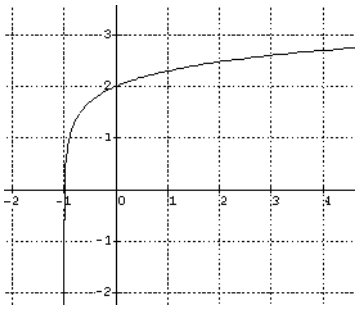
22. Find the sum of the first 10 terms of the sequence: –6, –4, –2 . . .

23. Evaluate: $\sum$ $\left(-\right)$

24. What is the 5th term in the expansion of $(x + 3)^6$?

Solutions:

1. a) $y = \frac{13}{4}x - \frac{3}{2}$ or in standard form: 13x – 4y = 6
   b) $y = -\frac{1}{2}x + \frac{33}{2}$ or in standard form: x + 2y = 33 (or 3x + 6y = 99)
   c) $y = -\frac{1}{2}x + 12$ or in standard form: x + 2y = 24
2. 710 The points (1, 120) and (49, 600) yield the equation y = 10x + 110
3. parabola and absolute value
4. –54
5. a) [4, ∞)
   b) (–∞, –1]
   c) [0, ∞)
6. (–∞, –2) and (0, ∞)
7. $-2x^2 + 8x - 4$
8. $f(x) = -|x-3| + 2$
9. complete the square to get: $y = 2(x + 4)^2 - 23$
10. Up, Down
11. $6x^2 + 13x - 2 + \frac{4}{x-1}$
12. 6 + 2i
13. $(x+3i)(x-3i)\left(x+\sqrt{3}\right)\left(x-\sqrt{3}\right)$

14. a)  b)  c) 

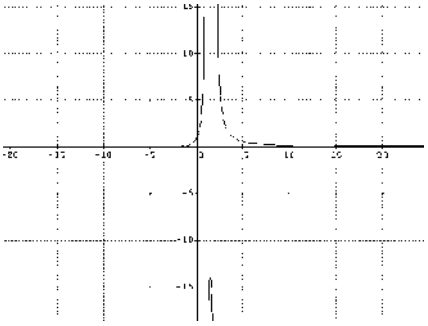
15. $b^2 = 16$

16. $\log_8 512 = 3$

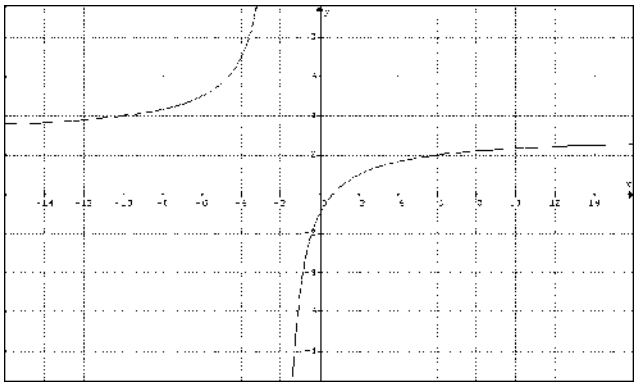
17. $\frac{8}{3}$ because log[(3x+7)(x-2)]=1 in exponential form becomes $3x^2+x-14=10$. -3 won't work.

18. a) $\dfrac{\ln\left(\dfrac{\frac{550}{800}-1}{449}\right)}{-0.8}$ b) $\dfrac{550}{1+449e^{-8}}$

19. a) D: ARN x≠2 or 1
VA: x = 2, x = 1
x-int: (–2, 0)
y-int: (0,1)
HA: y = 0



b) D: ARN, x≠-2
VA: x = –2
x-int: $\left(\frac{2}{3}, 0\right)$
y-int: (0, –1)
HA: y = 3



20. a) 1, $\frac{1}{3}$

b) 1, $\frac{1}{3}, \pm i$

21. 126
22. 60
23. 28/5
24. $1215x^2$