Pre-Calculus: Fall Semester Final Exam Review
**NO CALCULATORS!**

1. Find an equation of the line that:
   a) goes through the points (6, -3) and (-2, 1)

   b) is parallel to $-6x + 3y = 12$ and passes through the point: (4, -1)

   c) is perpendicular to 2x – y = 5 and goes through (4, 10)

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

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

4. Find the domain of each function:
   a) $y = x^2 + 4$ d) $y = \log(x + 5) - 3$

   b) $y = -|x + 3| - 1$ e) $y = \dfrac{x + 7}{x^2 - x - 12}$

   c) $y = \sqrt{x - 2}$

5. Determine the intervals over which the function is increasing, decreasing or constant Find the domain and range of each.
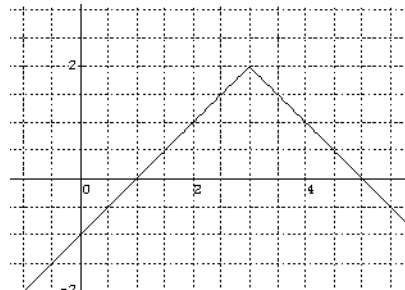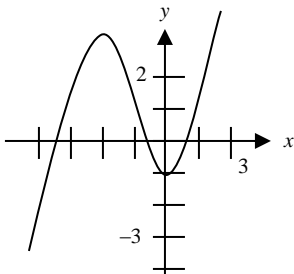
6. The graph above (the second graph in problem 5) is a transformation of the graph of $f(x) = |x|$. Find an equation for the function.

7. Find the vertex: $f(x) = 2x^2 + 16x + 9$

8. The height of a ball as it travels is given by the function: $h(x) = -2x^2 + 8x + 7$. Find its maximum height.

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

10. $(6x^3 + 7x^2 - 15x + 6) \div (x - 1)$

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

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

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

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

14. Find the x-intercepts: $y = 3x^2 - 7x - 6$

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

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

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

18. Solve: a. $\log(3x + 7) + \log(x - 2) = 1$ b. $\log(3x + 7) - \log(x - 2) = 1$

19. Solve: $12 = 2e^{5t}$

20. Simplify: $2\log4 - 3\log2 + ½\log9$

21. Use sigma notation to write the sum: $\dfrac{4}{-6}+\dfrac{7}{-5}+\dfrac{10}{-4}+\dfrac{13}{-3}+...+\dfrac{28}{2}$

22. Find the sum: $\displaystyle\sum_{n=1}^{400}\left(-2n+7\right)$

23. A brick patio has the approximate shape of a trapezoid. The patio has 40 rows of bricks. The first row has 8 bricks, the second row has 10 bricks, the third row has 12 bricks, and so on. How many bricks are in the patio?

24. Find the sum of the geometric sequence:

a) $-2,-1,-\dfrac{1}{2},-\dfrac{1}{4},-\dfrac{1}{8}...$

b) $5,-\dfrac{5}{3},\dfrac{5}{9},-\dfrac{5}{27},...$

c) $\displaystyle\sum_{n=0}^{\infty}2\left(\dfrac{1}{4}\right)^{n}$