

## Algebra II / Pre-Calculus Sample Problems

1) Solve:  $\frac{x^2 + x - 6}{x - 3} > 0$

2) Graph the following functions or relations using the rules of transformational geometry:

a.  $y = \ln(x + 4)$

b.  $y = (x - 3)^2 + 2$

c.  $\frac{x^2}{16} + \frac{y^2}{9} = 1$

d.  $y = e^{x-2}$

e.  $\frac{(x-2)^2}{36} - \frac{(y+1)^2}{4} = 1$

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

g.  $y = \frac{x^2 + x - 6}{(x - 3)^2}$

3) Divide, using long and/or synthetic division:

$$\frac{2x^3 - 3x^2 - x + 4}{x - 3}$$

4) Solve using natural logarithms:  $2^{3x} = 5$

5) Simplify:  $\frac{4-3}{2+3}$

6) Solve by completing the square:  $2x^2 = 6x + 7$

7) Solve:  $3x^2 + 6 = 2x$

8) Evaluate:  $(-8)^{-\frac{2}{3}} - 81^{-\frac{3}{4}}$

9)  $f(x) = x^2 + x + 3$   
 $g(x) = x^4 - x^2$

a. Are  $f$  and  $g$  even or odd functions? Describe the symmetries each function may have.

b. What is  $f(g(3))$ ?

c. For what real values of  $x$  does  $f(x) = g(x)$ ?

10) Evaluate:  $\csc(330^\circ) - \tan^2(-120^\circ)$

11) Graph:  $y = 3\cos(2x)$