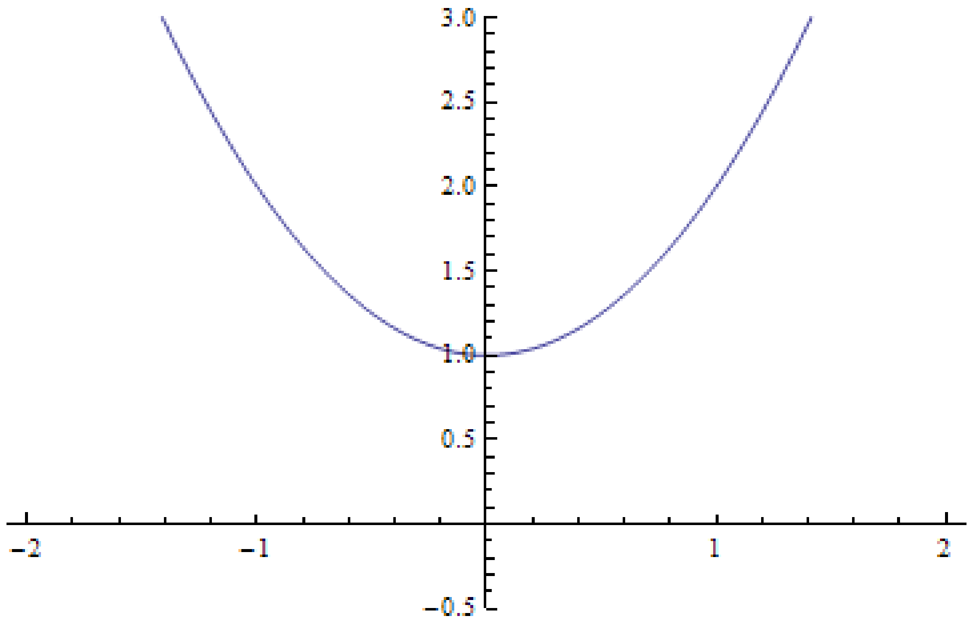
Math 32, Spring 2010, Section 101
Worksheet 6

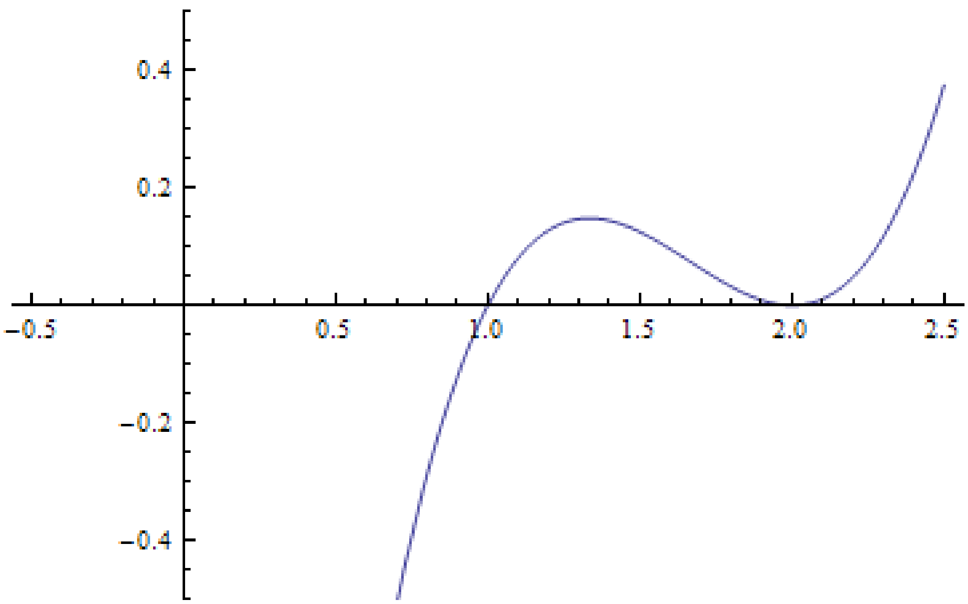
Work through the following problems in groups of about four. Take turns writing; everyone should get a chance to write for some of the problems. It's more important to understand the problems than to do all of them.

1. Graph the following polynomials. Label the x- and y-intercepts

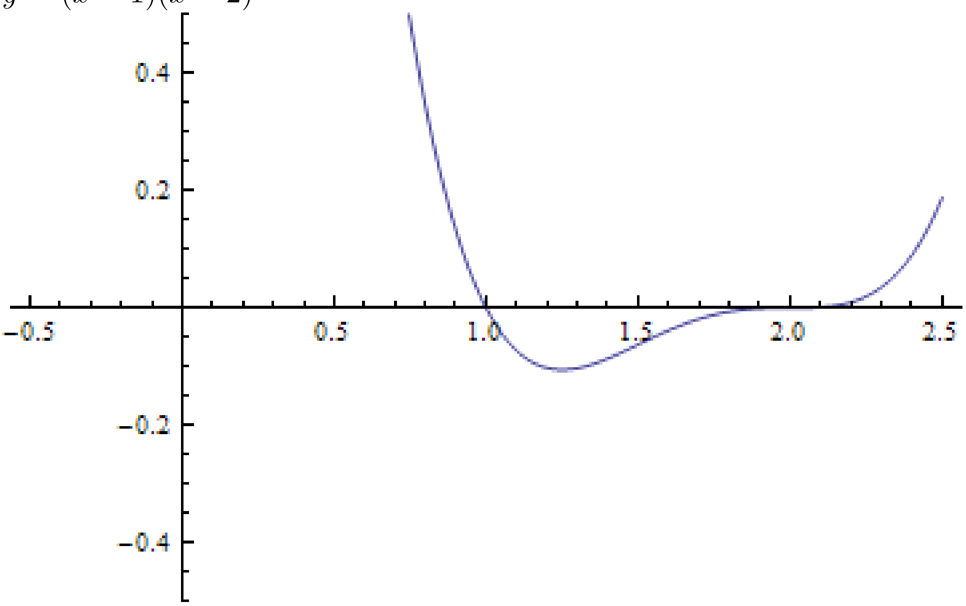
   $y = x^2 + 1$



   $y = (x - 1)(x - 2)^2$

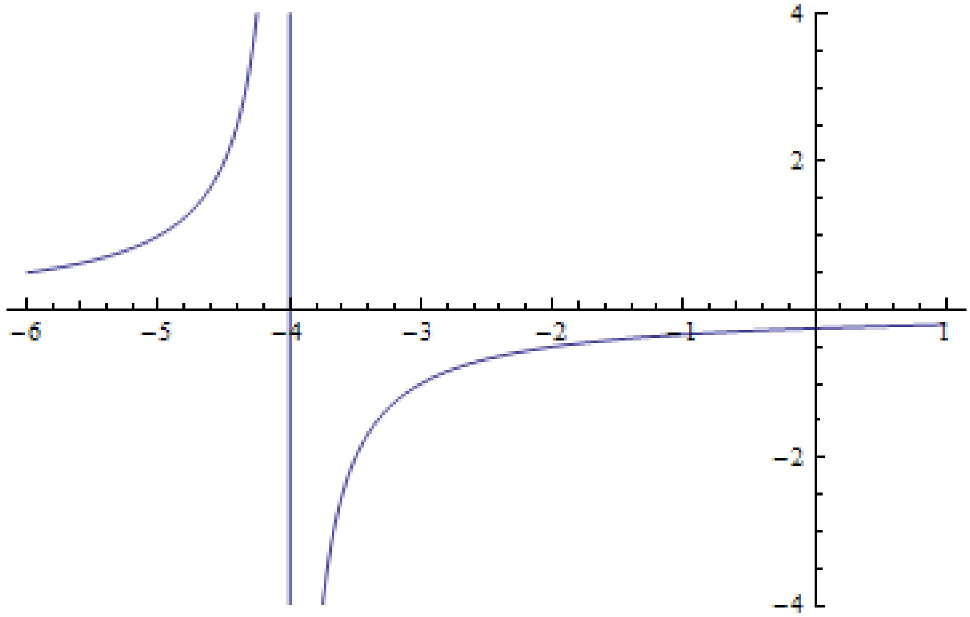

0.4
0.2
−0.2
−0.4
−0.5
0.5
1.0
1.5
2.0
2.5

$y = (x-1)(x-2)^3$



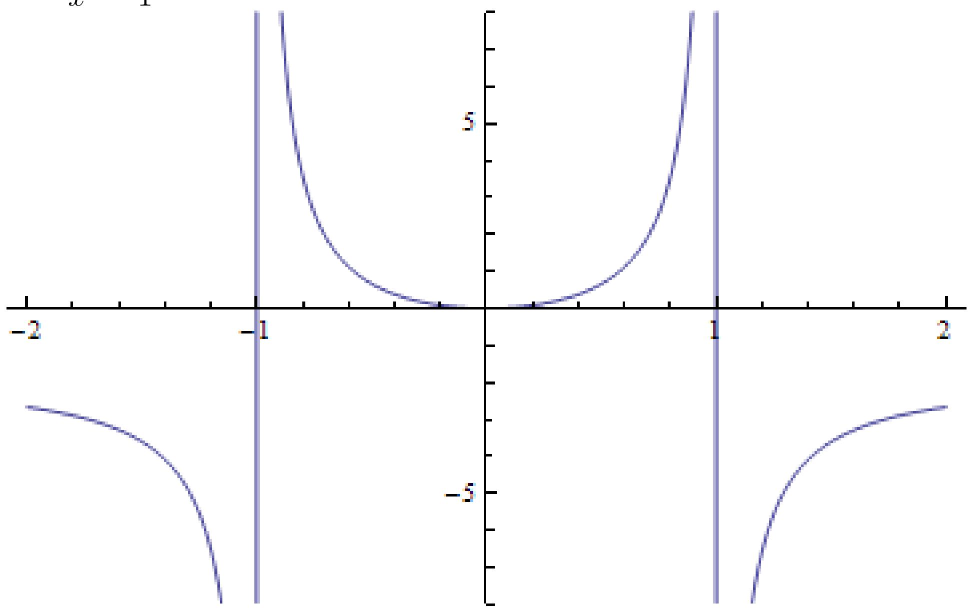
2. Graph the following rational functions. Specify the x-intcepts, y-intercepts, and any asymptotes.

   $y = \dfrac{-1}{x+4}$

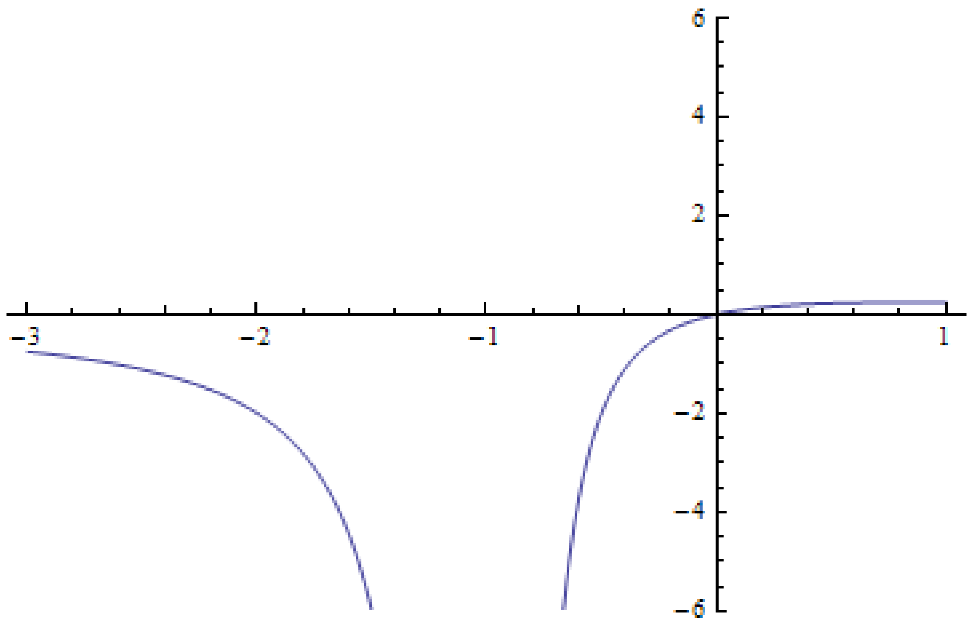


4
2
−6
−5
−4
−3
−2
−1
1
−2
−4

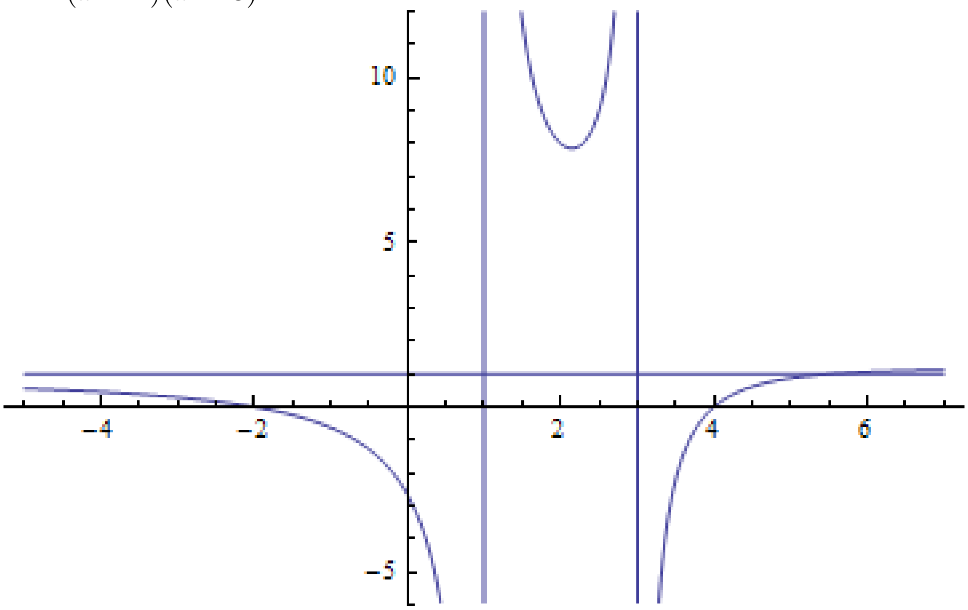
$$y = \frac{-2x^2}{x^2 - 1}$$



$$y = \frac{x}{(x+1)^2}$$



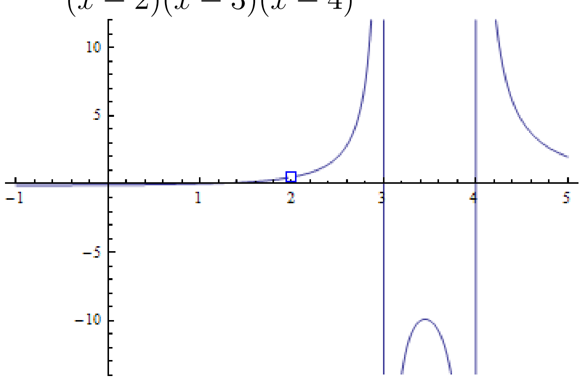
$$y = \frac{(x-4)(x+2)}{(x-1)(x-3)}$$



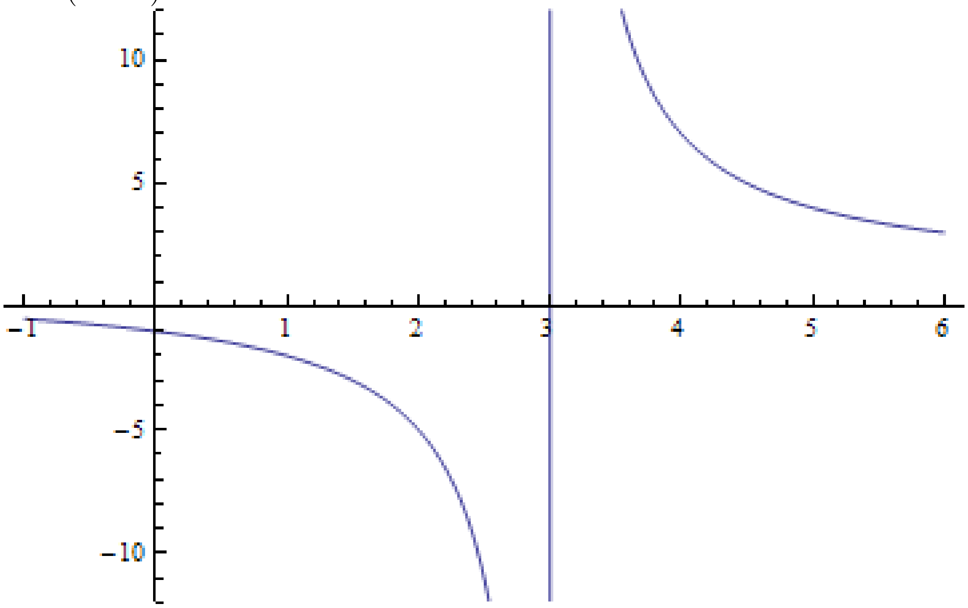
Note that the above graph crosses its horizontal asymptote between $x = 4$ and $x = 6$. One could find the exact value by setting $y = 1$ (the value of the horizontal aymptote) and solving for x.

3. Graph the following rational functions, specifying everything that seems relevent. (Hint: simplify first! but keep the domain of the original function)

$$y = \frac{(x-1)(x-2)}{(x-2)(x-3)(x-4)}$$



$$y = \frac{x^2 - 9}{(x-3)^2}$$



4. Give an example of a function that isn't a rational function, and graph it.

   Two possible examples that you should know how to graph are $y = \sqrt{x}$ and $y = e^x$.

5. Find all solutions to the equation $2^{2x} + 5 \cdot 2^x - 6 = 0$. (Hint: make a substitution.)

   Rewriting using properties of the exponential, we get $(2^x)^2 + 5 \cdot 2^x - 6 = 0$. Substituting $t = 2^x$ gives $t^2 + 5t - 6 = 0$, or $(t+6)(t-1) = 0$. Thus we get $t = 1$ or $t = -6$. We now go back and try to solve $t = 2^x$ for these values. Since $2^x > 0$ for all x, we cannot have $2^x = -6$. There is one solution to $2^x = 1$, and that is $x = 0$. This is our final answer.