

MATH 110-17 (Gwinn-Edwards)  
Midterm 2 Review

1. Section 4.1 Understand Intermediate Value Theorem for Polynomial Functions  
If  $f$  is a polynomial function and  $f(a) \neq f(b)$  for  $a < b$ , then  $f$  takes on every value between  $f(a)$  and  $f(b)$  in the interval  $[a, b]$ .
2. Use Intermediate Value Theorem to show that  $f$  has a zero between 2 and  $5/2$ .  
 $f(x) = 4x^4 - 9x^3 - 4x + 9$
3. Know how to apply Theorem on Horizontal Asymptotes.
4. Section 4.5 Rational Functions (you'll need to find V.A., H.A., x-intercepts, y-intercepts, and the point  $f$  crosses the H.A., and at least one point in each interval of the domain).
  - a) Sketch the graph of  $f(x) = \frac{5x+3}{3x-7}$
  - b) Sketch the graph of  $f(x) = \frac{x^2-3x-4}{x^2+x-6}$
5. Section 3.7 Operations on Functions.
  - a) For  $f(x) = \frac{x}{x-2}$ ,  $g(x) = \frac{3x}{x+4}$  find
    - i.  $(f+g)(x), (f-g)(x), (fg)(x), (f/g)(x)$  .
    - ii. the domain of  $f+g, f-g, fg$  .
    - iii. the domain of  $f/g$  .
  - b) For  $f(x) = \frac{x+2}{x-1}$ ,  $g(x) = \frac{x-5}{x+4}$  find
    - i.  $(f \circ g)(x)$  and its domain.
    - ii.  $(g \circ f)(x)$  and its domain.
6. Know how to recognize the graph of a 1-1 function (Horizontal Line Test)
7. Section 5.1 Inverse Functions
  - a. Find the inverse function of  $f(x) = \frac{1}{x+3}$

b. Find the inverse function of  $f(x) = \frac{5x+3}{2x-1}$

i. For each of these you may assume  $f$  is one-to-one.

ii. For each be sure to show that  $f(f^{-1}(x)) = x$  and  $f^{-1}(f(x)) = x$ .