

North Carolina State University  
MA 141 Section 004 Exam 1

Read all directions carefully. **A graphing calculator may NOT be used on this exam.** You must Show All Work for credit and clearly indicate your final answer; no work equals no credit. When you are finished fold your exam, write your name on the outside, turn it in, and then you may leave quietly. Good Luck!

- 1) (10 pts) Find all horizontal asymptotes of the function  $f(x) = \frac{1}{1+2e^x}$ .
- 2) (15 pts) Show that  $\lim_{x \rightarrow 0^+} \sqrt{x}e^{\sin \frac{\pi}{x}} = 0$ .
- 3) Let  $f(x) = 2x^3 - 1$ .
  - a) (5 pts) Show (by a line test or directly) that  $f(x)$  is one-to-one.
  - b) (5 pts) Find the inverse function  $f^{-1}(x)$ .
- 4) Evaluate the following limits.
  - a) (10 pts)  $\lim_{x \rightarrow 0} \frac{x^2 - 5x - 14}{-x^2 + 8x - 7}$
  - b) (10 pts)  $\lim_{x \rightarrow \infty} \frac{x^2 + \sqrt{2}}{x + 8}$
- 5) Let  $f(x) = \sin^{-1}\left(\frac{x^3}{16} + 1\right)$ .
  - a) (8 pts) Is  $f(x)$  continuous? Explain.
  - b) (5 pts) Find  $Dom_f$ .
  - c) (7 pts) Evaluate  $\lim_{x \rightarrow -2} f(x)$ .
- 6) a) (5 pts) Sketch the area trapped between (ie. touching all three curves)  
 $C_1$  a circle of radius 1 centered at  $(2,0)$ .  
 $C_2$  a circle of radius 1 centered at  $(-2,0)$ .  
and  $E$  an ellipse centered at the origin with major axis of 2 (x direction) and minor axis of  $\frac{1}{2}$  (y direction).  
b) (10 pts) Give equations for the three curves above  $C_1, C_2, E$ .
- 7) (10 pts) For  $f(x) = \frac{-5}{x}$  find the derivative  $f'(x)$  using the limit definition of the derivative.