

Math 180 E

FIRST HOUR EXAM

NAME _____

General Notes:

1. Show work.
2. Look over the test first, and then begin.
3. Calculators are not permitted on this exam. Carry out any calculations to the point at which you would need a calculator (for example, to take a square root or the logarithm of a number) and leave it in that form. Please also feel free to use symbols such as e , π , etc.

Friday September 28, 2012
100 pts.

I. Some definitions (5 pts. each)

a. What does it mean to say that a function is odd? As **part** of your answer, give an example of an odd function.

b. What is a rational function?

c. What is a transcendental function?

2. (10 points.) Let $f(x) = 2x^2 + 1$ and $g(x) = x - 1$. What is $(f \circ g)(x)$ in this case? Simplify your answer.

3. (10 points) What is the inverse of $f(x) = 2x + 4$?

4. (10 points) Find the equation of the line with slope 2 and passing through the point (1,3), and give a brief sketch of the line below (please note: I need **both** equation **and** sketch)

II. Logarithmic and trigonometric functions

1. (5 points each) Simplify the following expressions to a number (remember - no calculators)

a. $\log_2 4^3$

b. $\sin(\text{ArcSin}(\frac{1}{2}))$

2. (5 points) What is the value of $\text{ArcSin}(\frac{1}{\sqrt{3}})$? Please recall that $\text{ArcSin}(\frac{1}{\sqrt{3}}) = \sin^{-1}(\frac{1}{\sqrt{3}})$.

III. Limits and the like

1. (10 pts.) Give the informal definition of $\lim_{x \rightarrow a} f(x) = L$ as defined in this class (but not

the formal definition discussed this week), and use it to convince me that

$$\lim_{x \rightarrow 2} (2x + 1) = 5$$

2. (5 pts. each) Find the following limits. Show work.

a. $\lim_{x \rightarrow 2} \frac{x^2 - 4x - 2}{x - 2}$

b. $\lim_{x \rightarrow 4} \frac{x - 4}{\sqrt{x} - 2}$

c. $\lim_{h \rightarrow \infty} \frac{4x^3 - 3x^2 + 2x - 1}{2x^3 + x - 17}$

IV. Intermediate Value Theorem (5 points each)

1. State the Intermediate Value Theorem, with all assumptions.
2. The function $f(x) = x^3 - 4$ has a zero in the interval $[0, 2]$ (that is, a point c in the interval for which $f(c) = 0$). How do we know this? Note: it will not be sufficient simply to name the appropriate theorem. What conditions are satisfied?
3. The method of bisection can be used to find a solution to $x^3 - 4 = 0$ in the interval $[0, 2]$. Use the method of bisection to find the first two approximate solutions. Begin by setting Low = 0 and High = 2, and find the first two values of Mid. How do Low and High change after the first iteration?