

235 TEST 1.

*You may use your notebook during the last half hour of this exam.
You may NOT use calculators, cell phones, or peeking.*

Math 235
September 30, 2010

Name: _____
By printing my name I pledge to uphold the honor code.

1. For each limit form below, write “???” if the form is indeterminate. For those that are not indeterminate, describe what they must ultimately approach by choosing from this list: 0, 1, ∞ , or $-\infty$.

_____ $\frac{0^-}{0^+}$

_____ $\frac{1}{0^+}$

_____ $\frac{0^+}{1}$

_____ $\frac{-\infty}{\infty}$

_____ $\frac{1}{\infty}$

_____ $\frac{0^-}{\infty}$

_____ $\infty \cdot \infty$

_____ $\infty - \infty$

_____ $\infty \cdot 0^+$

2. Transcendental party! Show your work so I can see how you arrived at your answers.

a) Sketch a graph of $f(x) = 4 - e^{-3x}$. Label any important features.

b) Find the domain of $f(x) = \frac{x^2}{\ln(x-3)}$ and write it in interval notation.

c) Find the exact value of $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$.

3. Calculate each of the following limits. Show your work so I can see how you arrived at your answers and possibly award partial credit.

a) $\lim_{x \rightarrow -\infty} \frac{e^{4x}}{e^{4x} - 1}$

b) $\lim_{x \rightarrow \infty} \frac{e^{4x}}{e^{4x} - 1}$

c) $\lim_{x \rightarrow 0} \frac{e^{4x}}{e^{4x} - 1}$

4. Describe each of the following situations in mathematical notation with limits and/or values. If you don't know what I am talking about here then come ask me.
- a) $g(x)$ has a removable discontinuity at $x = 2$.

 - b) $h(x)$ is continuous on the interval $[0, 4)$.

 - c) Every power function is continuous on its domain.

 - d) For all $\epsilon > 0$, there exists $N > 0$ such that if $x \in (N, \infty)$, then $k(x) \in (L - \epsilon, L + \epsilon)$.

 - e) For all $\epsilon > 0$, there exists $\delta > 0$ such that if $0 < |x - 2| < \delta$, then $|r(x) - 4| < \epsilon$.
5. When Ray was sixteen he weighed 135 pounds. Now he is forty-five and weighs 172 pounds. Answer each of the following with one short, clear sentence in real-world terms. Please think before you write.
- a) Why we would expect Ray's weight $W(t)$ at age t to be continuous?

 - b) What does the Intermediate Value Theorem say about $W(t)$ on $[16, 45]$?

 - c) What does the Extreme Value Theorem say about $W(t)$ on $[16, 45]$?