232 TEST 1

You may use your notebook during the last fifteen minutes of this exam.
You may NOT use calculators, cell phones, loose papers, or peeking.

Math 232
September 23, 2011

Name: _____**key**_____ V1

1. True or false?

4 pts
each
___

(24 pts)

   (T) F   Every point (x, y) on the unit circle satisfies $x^2 + y^2 = 1$.

   (T) F   All exponential growth functions have a constant tripling time.

   T (F)   If $Q(t)$ is an exponential function with yearly percentage growth rate r, then $Q'(t) = rQ(t)$. $Q(t) = Q_0(1+r)^t$

   T (F)   The sine of a sum of angles is equal to the sum of the sines of the angles.

   T (F)   If the terminal edge of an angle θ is in the third quadrant, then the values of all six trigonometric functions of θ are negative.   ⊘

   (T) F   Every exponential function has a horizontal asymptote at $y = 0$.   ✗ ✗

2. Determine whether each of the following values is zero, positive, negative, or undefined. (Hint: Each answer is used one time.)

4 pts
each
___

(16 pts)

   $\ln(\frac{1}{e^2})$ (zero)   (positive)   ~~(negative)~~   (undefined) $\ln(e^{-2}) = -2$

   $\log_{\frac{1}{2}} 1$ (zero)   (positive)   (negative)   (undefined) $(\frac{1}{2})^0 = 1$

   $\sec \frac{7\pi}{8}$ (zero)   (positive)   (negative)   (undefined)   ⊘

   $\sin\left(-\frac{14\pi}{5}\right)$ (zero)   (positive)   (negative)   (undefined)   ⊘   oops ☺

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VI

3. Circle the correct answer for each limit. (Hint: Each answer is used exactly once.) hints

$$\lim_{x \to \frac{\pi}{2}} \frac{\sin(2\cos x)}{\cos x} \qquad 0 \qquad 1 \qquad ②) \qquad e \qquad \infty \qquad -\infty$$

$\frac{0}{0}$, L'H

$$\lim_{x \to \frac{\pi}{2}} (\tan x - \sec x) \qquad ⓪ \qquad 1 \qquad 2 \qquad e \qquad \infty \qquad -\infty$$

$\frac{\sin x - 1}{\cos x}$, L'H

6 pts each

$$\lim_{x \to 0^+} e^x \ln x \qquad 0 \qquad 1 \qquad 2 \qquad e \qquad \infty \qquad ⓧ(-\infty)$$

$1(-\infty) = -\infty$

(36 pts)

$$\lim_{x \to \infty} \frac{2^x + 1}{e^{-x}} \qquad 0 \qquad 1 \qquad 2 \qquad e \qquad ⓧ(\infty) \qquad -\infty$$

$\frac{\infty}{0^+} = \infty$

$$\lim_{x \to 0^+} (1 + 2x)^{\frac{1}{2x}} \qquad 0 \qquad 1 \qquad 2 \qquad ⓔ \qquad \infty \qquad -\infty$$

$(e^2)^{1/2}$

$$\lim_{x \to 2^+} \frac{\sqrt{x-2}}{\sin\sqrt{x-2}} \qquad 0 \qquad ①) \qquad 2 \qquad e \qquad \infty \qquad -\infty$$

$\frac{\theta}{\sin\theta} \to 1$

4. Calculate the derivatives of the functions below.

a) $f(x) = 2e^{3\cos x \csc x}$

$$f'(x) = \boxed{2e^{3\cos x \csc x} \cdot (-3\sin x \csc x - 3\cos x \csc x \cot x)}$$

8 pts each

b) $f(x) = \tan^2(x^3)$

$$f'(x) = \boxed{2\tan(x^3) \cdot \sec^2(x^3) \cdot 3x^2}$$

0 ϕ
1 ?
2 bad chain or good prod
⋮
6 chain −1
8 all

(24 pts)

c) $f(x) = (\sin x)^x$

$$\ln y = x \ln(\sin x)$$

$$\frac{1}{y} y' = 1 \cdot \ln(\sin x) + x \cdot \frac{1}{\sin x} \cos x$$

$$y' = \boxed{(\sin x)^x \left(\ln(\sin x) + \frac{x \cos x}{\sin x} \right)}$$

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