4. Fill in the blanks to complete each statement.

(basic skills in #23–68 in 5.2, #17–44 in 5.3, #23–62 in 6.3, and #45–66 in 6.4)

3 pts each

↓

30 pts

$$\lim_{x \to 0} \tan^{-1} x = \underline{0}$$

$$\frac{d}{dx}(\sin^{-1}(x^3)) = \underline{\frac{1}{\sqrt{1-(x^3)^2}}(3x^2)}$$

$$\lim_{x \to 0} \frac{2}{4 + e^{-2x}} = \underline{\frac{2}{5}}$$

$$\frac{d}{dx}(\ln(x^5 + 1)) = \underline{\frac{1}{x^5+1}(5x^4)}$$

$$\lim_{h \to 0}(1 + h)^{\frac{1}{h}} = \underline{e}$$

$$\frac{d}{dx}(\ln|x|) = \underline{\frac{1}{x}}$$

$$\lim_{x \to \frac{\pi}{2}^-} \sec x = \underline{\infty}$$

$$\frac{d}{dx}(\sec^2 x) = \underline{2\sec x \cdot \sec x \tan x}$$

$$\lim_{x \to 0^+} \csc 3x = \underline{\infty}$$

$$\frac{d}{dx}(2^{3x+1}) = \underline{(\ln 2)\, 2^{3x+1}\,(3)}$$

5. Circle ALL of the following that are greater than 1, and cross out the others.

(similar skills as #29–36 in 5.1, #67–70 in 6.1, and #23–38 in 6.4)

8 pts

A) ~~$\ln 3 - \ln 2$~~   B) ~~$\tan(\frac{\pi}{13})$~~   C) ⭕ $\sec^{-1}(-1)$ D) ⭕ $e^{0.5}$

6. Circle ALL of the following limits that are initially in some indeterminate form, before any algebra or rewriting of any kind, and cross out the rest.

(basic skills in #23–68 in 5.2, TB in 5.5, #23–42 in 6.3, and #45–52 in 6.4)

8 pts

A) ~~$\displaystyle\lim_{x \to 0^+} \frac{x}{\ln x}$~~   B) ⭕ $\displaystyle\lim_{x \to 0}(1 + x)^{\frac{3}{x}}$ C) ~~$\displaystyle\lim_{x \to \infty} x^{\ln x}$~~   D) ~~$\displaystyle\lim_{x \to \infty} \frac{x^3}{\tan^{-1} x}$~~

7. Circle ALL of the following that are equal to $\dfrac{\tan^{-1} x}{\sin^{-1} x}$, and cross out the rest.

(similar skills as #51 in 6.4)

8 pts

A) ~~$\dfrac{\sin x}{\tan x}$~~   B) ~~$\dfrac{\cot x}{\csc x}$~~   C) ⭕ $\dfrac{\arctan x}{\arcsin x}$ D) ~~$\left(\dfrac{\tan x}{\sin x}\right)^{-1}$~~

8. Circle ALL of the following that are valid trigonometric identities, and cross out the rest.

(similar to #5–8, #9–12, and #44–49 in 6.2)

8 pts

A) ⭕ $1 - \cos^2 \theta = \sin^2 \theta$ C) ⭕ $\csc(-\theta) = -\csc(\theta)$

B) ~~$\sin \theta \cos \theta = 1 + \cos \theta$~~   D) ~~$2\sin^2 \theta - \cos 2\theta = 1$~~

+2 free

232 TEST 2

You may use your notebook during the last fifteen minutes of this exam.
You may NOT use calculators, cell phones, loose papers, magic, or peeking.
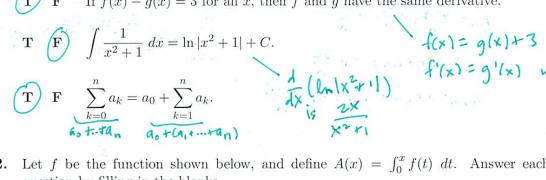
Math 232
March 16, 2012

Name: ___ *★ key ★* ___

1. Determine whether each of the following is True (T) or False (F).

   (similar to #1 in 7.1, 7.2, 8.1)

   (T) F   If f is positive and decreasing on $[a, b]$, then any Right Sum for f on $[a, b]$ will be an underapproximation.

   (T) F   If f is positive and concave up on $[a, b]$, then any Trapezoid Sum for f on $[a, b]$ will be an overapproximation.

   4 pts each

   ↓

   24 pts

   T **(F)**   If $f(x) - g(x) = 3$ for all x, then f and g have the same antiderivative.

   (T) F   If $f(x) - g(x) = 3$ for all x, then f and g have the same derivative.

   T **(F)** $\int \dfrac{1}{x^2 + 1}\, dx = \ln|x^2 + 1| + C.$

   (T) F $\displaystyle\sum_{k=0}^{n} a_k = a_0 + \sum_{k=1}^{n} a_k.$

   $\underbrace{}_{a_0 + \cdots + a_n} \quad \underbrace{}_{a_0 + (a_1 + \cdots + a_n)}$

   e.g. $f(x) = x^2 + 3$
   $g(x) = x^2$
   not same antiderivs

   $f(x) = g(x) + 3$
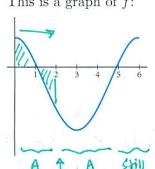   *$f'(x) = g'(x)$ ✓*

   $\frac{d}{dx}(\ln|x^2 + 1|)$ is $\frac{2x}{x^2 + 1}$

2. Let f be the function shown below, and define $A(x) = \int_0^x f(t)\, dt$. Answer each question by filling in the blanks.

   (similar to #15 in 8.3)

   A inc.   A dec.   A inc.

   This is a graph of f:

   $A(x)$ is positive on the interval(s) ___ $\approx [0, 2]$ ___   *5 pts*

   $A(x)$ is increasing on the interval(s) ___ $[0, 1], [5, 6]$ ___   *6 pts*

   $A(x)$ is zero at the point(s) ___ $x \approx 2, \; x = 0$ ___   *5 pts*

   5/6 pts each

   ↓

   16 pts

   WARNING: The questions above concern the function A, which is NOT the function that is in the picture.

   A pos — A zero — A neg — still neg but inc.

   note $A' = f$, so A inc. when $A' = f$ is pos.

   40