Math 1410

Final Exam Review Worksheet
Fall 2011

Work out each problem. When you finish, find the answer listed on the back page and its corresponding letter. Fill in that letter for each space where you find the question number. Question number 0.5 is done as an example.

0.5) Find the derivative. $f(x) = 2.7x$

Answer: $f'(x) =$ 2.7

1) Compute the derivative of $y = 2^{\tan(x)}$ and evaluate it at $x = \frac{\pi}{4}$.

Answer: _____

2) Find the exact value of c so that f is continuous at $x = 2$, where

$$f(x) = \begin{cases} \frac{x^3-4x}{3x-6} & \text{if } x < 2 \\ \sqrt{c}x & \text{if } x \geq 2 \end{cases}$$

Answer: c=_____

3) Given the function $f(x) = \ln(5 - x^2)$, find the linearization $L(x)$ for the function at $p = 2$. Use $L(x)$ to approximate $\ln(0.59)$. (Hint: Consider $x = 2.1$)

Answer: $\ln(0.59) \approx$ _____

4) Use the limit definition of the derivative to compute $f'(x)$ for $f(x) = \dfrac{2x+1}{3-x}$. For what value(s) of x is the function $f'(x)$ discontinuous?

Answer: $x =$_____

5) Let $f(x) = e^{-x}(4x^2 + 20x + 29)$. Find the x values at which the tangent line to the graph of f is horizontal.

Answer: The fractional value for $x =$_____

6) $G(x) = f(g(x)) + f'(x)g(x)$. Assume, $g(2) = 2$, $g'(2) = 3$, $f(2) = 1$, $f'(2) = -1$, and $f''(2) = 3$. Find $G'(2)$.

Answer: $G'(2) =$_____

7) Use the limit definition of the derivative to compute $f'(6)$ for the function $f(x) = \sqrt{3x-2}$.

Answer: _____

8) Without using L'Hospital's rule, compute the following limit:

$$\lim_{x\to\infty} \frac{3x^6 + 4x^3 + 7}{9x^6 + 2x^4 + 3x^2 + 5}$$

Answer: _____

9) Use calculus to find the slope of the curve $2x - 4y^2 = xy^2 - 3$ at the point $(1, 1)$.

Answer: _____

10) A particle is moving along a horizontal line. Its position function is given by $s(t) = t^3 - 5t^2 + 10t + 15$. What is the t value that marks the left endpoint of the interval on which the function has both positive acceleration and is moving to the right?

Answer: _____

11) The temperature in a town in Alaska in modeled on the equation $d(t) = \frac{2}{3}t^3 - t^2 - 24t$ where t is in hours and $t = 0$ is noon. For the time interval $[-5, 5]$, find the lowest temperature reached.

Answer: _____

12) Calculate the limit: $\lim_{x\to 0^+} (\cos x)^{\frac{1}{x^2}}$

Answer: _____

13) A woman standing on a boat is looking through a telescope at the top of a cliff 240 feet above sea level. As the boat approaches the cliff, she must increase the angle of the telescope to keep it focused on the top of the cliff. Assuming the boat is approaching in a straight line at 50 feet/second, at what rate is the angle (in radians) of the telescope increasing when the boat is 100 feet from the cliff? (Round your answer to 2 decimal places)

Answer: _____ $\frac{radians}{second}$

14) A right triangle with a hypotenuse 9 inches long is rotated about one of its legs to generate a right circular cone. Find the height of such a cone so that the volume of the cone is maximized. (Note: volume of a cone is $V = \frac{1}{3}\pi r^2 h$)

Answer: height=_____

15) Use Newton's method to find a solution to $\sin x = 2x - \pi + 1$. Using $x_1 = 1.5$ as a first guess, find x_3 (the third approximation) to 2 decimal places.

Answer: x_3=_____

16) If $f''(\theta) = \sin\theta + \cos\theta$, $f(0) = 3$, and $f'(0) = 4$, find $f(\theta)$ and then $f(\pi)$.

Answer: $f(\pi)$=_____

17) Use right endpoints and 3 subintervals to find an approximation for the area under the curve $(x^2 + 2)$ on the interval $[0, 6]$.

Answer: _____

18) Calculate $\int_1^4 (-x^2 + 5x - 4)dx$.

Answer: _____

19) Find the equation for the tangent line at $t = 0$ for the parametric curve $x = \cos t + \sin(2t)$, $y = \sin t + \cos(2t)$.

Answer: Slope of the tangent line=_____

To find out what the tiger says, solve all the problems and fill in the blanks below.

Answer	Letter	Answer	Letter
2.7	I	3.6	A
11	B	0	N
-0.45	Z	$3\sqrt{3}$	B
5π +5	R	0.6	S
3	I	$1/\sqrt{e}$	A
ln(16)	I	124	S
4	O	9	R
2.47	P	5/3	N
1/3	S	1.57	W
3/8	T	-0.4	C
234.5	F	9/2	H
47.8	A	5	N
-208/3	G	16/9	E
-120	O	192	J
1/21	T	0.18	T
1/10	O	1/2	R
89.34	R	4260	C
-3/2	T	21.9	R

$\overline{0.5}$ $\overline{6}$ $\overline{8}$ $\overline{5}$ $\overline{4}$ $\overline{10}$ $\overline{3}$ $\overline{7}$

$\overline{13}$ $\overline{11}$ $\overline{11}$ $\overline{2}$ $\overline{19}$ $\overline{17}$ $\overline{12}$ $\overline{16}$ $\overline{2}$

$\overline{14}$ $\overline{9}$ $\overline{16}$ $\overline{6}$ $\overline{15}$ $\overline{4}$ $\overline{5}$ $\overline{18}$ $\overline{1}$ $\overline{7}$