Math 231

Review Worksheet

Fall 2008

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 $x = 2$,

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

Answer: c=_____

3) Given the function $f(x) = \ln(5 - x^2)$, find the linear approximation to the function at $a = 2$ 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 $f(x) = e^{-x}(2x^2 - 3x - 9)$. Find the x value(s) at which the tangent line to the graph of f is horizontal.

Answer: $x =$_____

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:

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

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 x value that marks the left endpoint of the interval on which the function is speeding up?

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. Assuming the boat is approaching the cliff 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 $f(\pi)$.

Answer: $f(\pi)$=_____

17) Use right endpoints and 3 rectangles of equal width to find an approximation for the integral

$$\int_1^7 (x^2 - 5)dx$$

Answer: _____

18) Find the exact value of the area in the first quadrant bounded by the x-axis and the curve $f(x) = -x^2 + 5x - 4$.

Answer: _____

19) Let $g(x) = \int_{x^3-1}^{3} \ln(e + r^2)dr$. Using the fundamental theorem of calculus, calculate $g'(x)$ and then find $g'(1)$

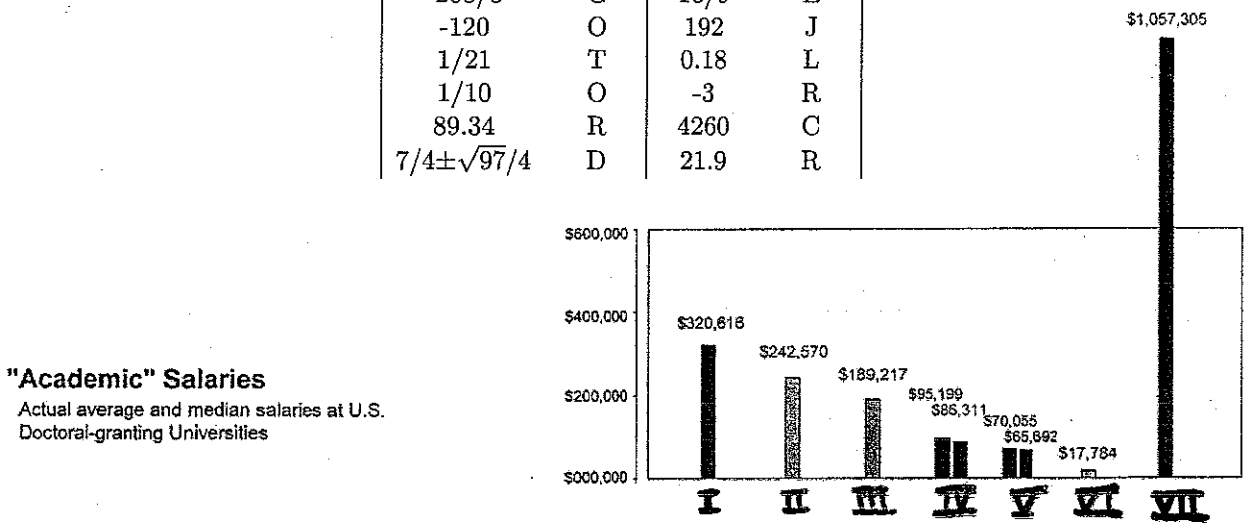
Answer: $g'(1)$ =_____

20) Evaluate the definite integral (Round your answer to the nearest whole number):

$$\int_1^4 \frac{(\sqrt{x}+1)^8}{\sqrt{x}}dx$$

Answer: _____

Answer	Letter	Answer	Letter
2.7	U	3.6	A
11	B	0	N
-0.45	Z	$3\sqrt{3}$	W
5π +5	R	0.6	S
3	I	$1/\sqrt{e}$	A
ln(16)	P	136	F
4	O	9	R
2.47	P	5/3	U
1/3	S	1.57	V
3/8	T	-0.4	Y
234.5	F	3/2	H
47.8	A	5	N
-208/3	G	16/9	E
-120	O	192	J
1/21	T	0.18	L
1/10	O	-3	R
89.34	R	4260	C
$7/4 \pm \sqrt{97}/4$	D	21.9	R



(I) $\overline{0.5}\ \overline{6}\ \overline{4}\ \overline{15}\ \overline{2}\ \overline{16}\ \overline{8}\ \overline{4}\ \overline{7}\ \overline{3}$ $\overline{1}\ \overline{19}\ \overline{2}\ \overline{8}\ \overline{4}\ \overline{5}\ \overline{2}\ \overline{6}\ \overline{7}$

(II) $\overline{1}\ \overline{16}\ \overline{9}\ \overline{15}\ \overline{9}\ \overline{8}\ \overline{7}$

(III) $\overline{5}\ \overline{2}\ \overline{12}\ \overline{6}\ \overline{8}$

(IV) $\overline{7}\ \overline{2}\ \overline{6}\ \overline{10}\ \overline{19}\ \overline{2}\ \overline{5}$ $\overline{1}\ \overline{16}\ \overline{9}\ \overline{17}\ \overline{2}\ \overline{8}\ \overline{8}\ \overline{9}\ \overline{16}\ \overline{8}$

(V) $\overline{10}\ \overline{6}$ $\overline{7}\ \overline{2}\ \overline{6}\ \overline{10}\ \overline{19}\ \overline{2}\ \overline{5}$ $\overline{1}\ \overline{16}\ \overline{9}\ \overline{17}\ \overline{2}\ \overline{8}\ \overline{8}\ \overline{9}\ \overline{16}\ \overline{8}$

(VI) $\overline{11}\ \overline{19}\ \overline{12}\ \overline{5}$ $\overline{8}\ \overline{7}\ \overline{10}\ \overline{5}\ \overline{2}\ \overline{6}\ \overline{7}\ \overline{8}$

(VII) $\overline{17}\ \overline{9}\ \overline{9}\ \overline{7}\ \overline{14}\ \overline{12}\ \overline{13}\ \overline{13}$ $\overline{20}\ \overline{9}\ \overline{12}\ \overline{20}\ \overline{18}\ \overline{2}\ \overline{8}$