University of Central Florida

MOCK Test 1

Calculus I MAC2311 (Sections 22 to 30)

Duration: 1 hour

Examiner: Alexandru Tamasan

Aids: No calculators, cell-phones, books, or notes are allowed.

Your test will be formatted like this. However, the content will be different. Practice on your own to gauge your knowledge

NAME (Please Print): ______________________________

NID: ______________________________

Answer questions 1 to 10 on the SCANTRON sheer. Insert your answers to Problems 11, 12, 13, and 14 in the space provided. The last for problems are equally weighted.

Use both sides if needed. Complete work must be shown for full credit.

Problem	Points	Score
11	10	
12	10	
13	10	
14	10	
Total	40	

Answer the following question on the SCANTRON sheet provided (don't forget your Name and NID) by filling in the corresponding bullet.

1. If a function is continuous at the point, then it must be differentiable there.

   A: The statement is true.

   B: The statement is false.

2. If f is continuous at $x = 5$ and $f(5) = 2$, then $\lim_{x\to 2} f(4x^2 - 11)$ is equal to

   A: 5

   B: 2

   C: $f(89)$

3. If f is differentiable then $\frac{d}{dx} f(\sqrt[3]{x})$ equals

   A: $\frac{f'(x)}{3\sqrt[3]{x^2}}$.

   B: $\frac{f'(\sqrt[3]{x})}{3\sqrt[3]{x^2}}$.

   C: $f'(\sqrt[3]{x})\sqrt[3]{x}$

   D: $f'(\sqrt[3]{x})$

4. Find the statement below which is false.

   A: The function 2^x makes sense for all numbers in $(-\infty, \infty)$

   B: The function $\log_2(x)$ makes sense for all numbers in $(-\infty, \infty)$

   C: The function $f(x) = 3^x$ is increasing.

   D: The function $\log_{\frac{1}{2}}(x)$ is decreasing.

5. Let

$$f(x) = \begin{cases} \sqrt{-x}, & x < 0 \\ x^2, & 0 \le x < 2 \\ 10 - 3x, & x \ge 2 \end{cases}$$

   Find the statements which are false:

   A. f is not defined for $x < 0$.

   B. f is continuous at $x = 0$.

   C. f is continuous at $x = 2$.

6. The left sided limit $\lim_{h\to 0^=} \frac{\sin 2h}{h^2}$

   A. equals 2

   B. equals ∞

   C. equals $-\infty$

7. Let $f(x) = \sqrt{x^2 + 1}$ and $g(x) = |x|$. Find the statements which are false.

   A. f is differentiable in $(-\infty, \infty)$

   B. g is differentiable in $(-\infty, \infty)$

   C. The composition function $f \circ g$ is differentiable everywhere.

   B. The composition function $g \circ f$ is differentiable everywhere

8. If f and g are differentiable then $\frac{d}{dx}(f(x)g(x)) = f'(x)g'(x)$ is

   A. TRUE

   B. FALSE

9. Let $f(x) = \ln(2^{\sin x})$. Then $f'(x)$ is

   A. $(\sin x) \ln 2$

   B. $(\cos x) \ln 2$

   C. $\frac{1}{2^{\sin x}}(\ln 2) \cos x$

10. Let $f(x) = (x^2 + 1)^{10}$. Find the false statement below:

   A. f is a polynomial of degree 20.

   B. $\frac{d^{19}}{dx^{19}} f(x) = 0$ for all x.

   C. $\frac{d^{20}}{dx^{20}} f(x)$ is constant.

   D. $\frac{d^n}{dx^n} f(x) = 0$ for all x if $n \geq 21$.

11. a) Simplify the fraction to compute $\lim_{x\to 3} \frac{x^2-9}{2x^2-6x}$.

b) Use the continuity of arctan and your answer above to find $\lim_{x\to 3} \arctan\left(\frac{x^2-9}{2x^2-6x}\right)$.

c) Simplify the function to compute the (left sided)

$$\lim_{x\to 3^-} \frac{x^2-9}{(2x^2-6x)^2}$$

d) Does the limit below exist? If yes compute it, if no, justify why not.

$$\lim_{x\to 3^-} \arctan\left(\frac{x^2-9}{(2x^2-6x)^2}\right).$$

12. Let $f(x) = e^x - 2 + 2x$.

a) Write the (largest) domain of f as an interval.

b) Calculate:

$$f(0) =$$
$$f(1) =$$

c) Use the intermediate value theorem and justify that $e^x = 2 - 2x$ has at least one solution.

d) Can $e^x = 2 - 2x$ have more than one solution? You may sketch the graphs of $y = e^x$ and of $y = 2 - 2x$ on the system system of coordinates to justify your answer.

13. Find the equation of the tangent line to the curve $y = \sqrt{4 + \sin x}$ at the point $P(0, 2)$.

a) Check that the point $P(0, 2)$ is on the curve.

b) Find the formula for the derivative $y'(x)$.

c) Find the slope of the tangent line to the curve at the point $P(0, 2)$

d) Find the equation of the tangent line.

14. Consider y given implicitly in terms of x by the equation $xy + e^y = e$.

(i) Find $y(0)$.

(ii) Use implicit differentiation to find a relation between x, $y(x)$ and $y'(x)$.

(iii) What is $y'(0)$?

(iv) Differentiation once more your formula in (ii), and use the values you found for $y(0)$ and $y'(0)$ to find $y''(0)$.