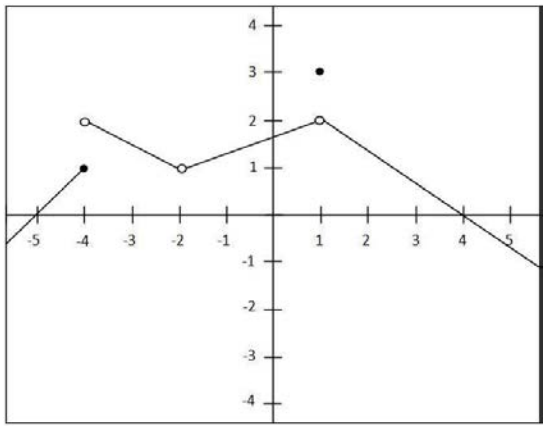
Exam I - Math 141 Spring 2016

Name: _____ **Exam Version A**

This exam is multiple choice. Each problem is worth five points, for a maximum possible total number of points of 105 (5 possible bonus points). Make sure you fill in your answers on the scantron answer sheet provided. Fill in your name, student ID number, and the exam version on the scantron answer sheet. You may use this exam to work out the problems. You must hand in this exam as well as the scantron answer sheet. To hand in your exam, be prepared to show your picture ID. This is a closed book, closed notes exam. Calculators are allowed but must be equivalent to a TI-83/84; no TI-89s or equivalent are allowed. No cell phones are permitted outside of your bag at anytime during the test.

GOOD LUCK!

Use the following graph to answer questions 1 through 5.



1. $\lim_{x \to 4} f(x) =$

   (a) 0

   (b) 4

   (c) does not exist (or undefined)

   (d) none of the above

2. $\lim_{x \to -4^+} f(x) =$

   (a) 1

   (b) 2

   (c) does not exist (or undefined)

   (d) none of the above

3. $\lim_{x \to -2} f(x) =$

   (a) -2

   (b) 1

   (c) does not exist (or undefined)

   (d) none of the above

4. $f(1) =$

   (a) 1

   (b) 2

   (c) does not exist (or undefined)

   (d) none of the above

5. Is the function f continuous at $x = 1$?

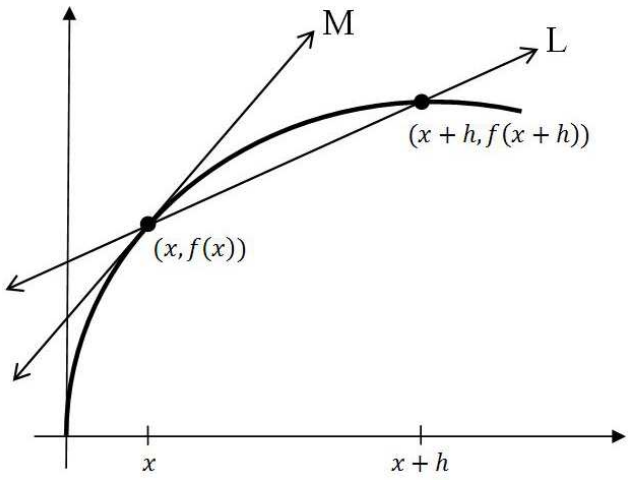
   (a) Yes

   (b) No, because $\lim_{x \to 1} f(x)$ does not exist.

   (c) No, because $f(1)$ is not defined.

   (d) Cannot be determined with the information provided

Use the following graph to answer questions 6 and 7.



6. Which formula below is a formula for the **slope** of the line **L**?

   (a) $\dfrac{f(x)-f(h)}{h}$

   (b) $\lim\limits_{h\to 0}\dfrac{f(x)-f(x+h)}{h}$

   (c) $\dfrac{f(x+h)-f(x)}{x+h}$

   (d) $\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$

   (e) $\dfrac{f(x+h)-f(x)}{h}$

7. Which formula below is a formula for the **slope** of the tangent line **M**?

   (a) $\lim\limits_{h\to 0}\dfrac{f(x)-f(h)}{h}$

   (b) $\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$

   (c) $\lim\limits_{h\to 0}\dfrac{f(x)+h-f(x)}{h}$

   (d) $\dfrac{f(x)-f(x+h)}{h}$

   (e) $\dfrac{f(x+h)-f(x)}{h}$

8. $\lim_{x \to -3} \left(\frac{x^2 - 9}{x + 3} \right) =$

   (a) 0
   (b) 6
   (c) -6
   (d) does not exist (or undefined)

9. $\lim_{x \to \infty} \left(\frac{2}{x + 10} + 5 \right) =$

   (a) 0
   (b) 5
   (c) ∞
   (d) does not exist

10. For $f(x) = x^2 + 10x + 1$, simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$?

    (a) $2x - 10$
    (b) $\underline{2xh + h^2 + 10h}$
    (c) $\underline{2xh + h^2 + 10x}$
    (d) $2x + h + 10$

11. Find the slope of the tangent line to the graph of $f(x) = 3x^2 - 4$ at the point $(2, 8)$.

    (a) -4
    (b) 3
    (c) 8
    (d) 12

12. If $y = \sqrt{x} + \frac{6}{x}$, then $\frac{dy}{dx} =$

    (a) $\frac{1}{2}x^{-1/2} - 6x^{-2}$
    (b) $\frac{1}{2}x^{3/2} - 6x^{-2}$
    (c) $x^{1/2} + 6x^{-1}$
    (d) $\frac{1}{2}x^{-1/2} - 6x$

13. If the equation of the tangent line to the graph of a function f at $x = -2$ is $y = -x + 3$, then

(a) $f(-2) = 5$ and $f'(-2) = 1$

(b) $f(-2) = 3$ and $f'(-2) = -1$

(c) $f(-2) = 5$ and $f'(-2) = -1$

(d) $f(-2) = 5$, but there is not enough information to determine $f'(-2)$

14. Let $f(x) = 2x - x^3$. The equation of the tangent line to $f(x)$ at the point $(1, 1)$ is

(a) $y = -x + 2$

(b) $y = -x + 1$

(c) $y = 2 - 3x^2$

(d) $y = x + 2$

15. Let $y = (3x - 3)(2x^2 + x - 5)$. Then $\dfrac{dy}{dx}$ is

(a) $3(4x + 1)$

(b) $(3x - 3)(4x + 1)$

(c) $3(2x^2 + x - 5) + (3x - 3)(4x + 1)$

(d) $3(2x^2 + x - 5) - (3x - 3)(4x + 1)$

16. Let $y = \dfrac{t^2 - 9}{t + 3}$. Simplify $\dfrac{dy}{dt}$.

(a) 1

(b) $t + 3$

(c) $2t$

(d) $t - 3$

17. Let $y = \dfrac{x}{5 + 2x} - 2x^4$. Then y' is

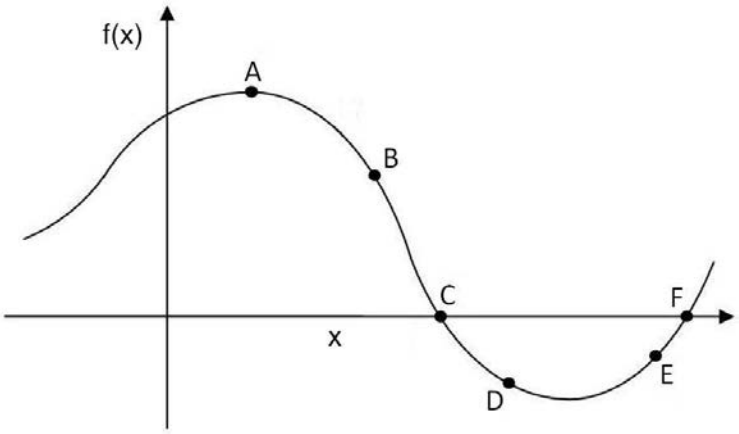
(a) $\dfrac{5}{(5 + 2x)^2} + 8x$

(b) $\dfrac{5}{(5 + 2x)^2} - 8x^3$

(c) $1/2 - 8x^3$

(d) $1/2 - 8x$

Use the following graph to answer questions 18 through 20.



18. At point **A**

    (a) $f(x)$ is positive and $f'(x)$ is zero
    (b) $f(x)$ is zero and $f'(x)$ is positive
    (c) $f(x)$ is negative and $f'(x)$ is negative
    (d) none of the above

19. At point **B**

    (a) $f(x)$ is positive and $f'(x)$ is positive
    (b) $f(x)$ is negative and $f'(x)$ is negative
    (c) $f(x)$ is positive and $f'(x)$ is negative
    (d) none of the above

20. $f'(x)$ at point **C** is larger than

    (a) $f(x)$ at point **C**
    (b) $f'(x)$ at point **A**
    (c) $f'(x)$ at point **F**
    (d) none of the above

21. The temperature T of a person during an illness is given by

$$T(t) = \frac{4t}{t^2 + 1} + 98.6,$$

where T is the temperature, in degrees Fahrenheit, at time t, in hours. Find the rate of change of the temperature at $t = 2$ hr.

(a) 100.2 degrees Fahrenheit

(b) 100.2 degrees Fahrenheit per hour

(c) -0.48 degrees Fahrenheit

(d) -0.48 degrees Fahrenheit per hour

(e) none of the above