

Exam I - Math 141 Fall 2012

Name: _____

Exam Version A

This exam is multiple choice. 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.

1. Given $f(x) = 3x^2 - 4x + \frac{3}{x} + \sqrt{x}$, find $f'(x)$.

(a) $f'(x) = 6x - 4 - \frac{3}{x^2} + \frac{1}{2}x^{-\frac{1}{2}}$

(b) $f'(x) = 6x - 4 - 3x^2 + \frac{1}{2}x^{\frac{1}{2}}$

(c) $f'(x) = 3x - 4 + \frac{3}{x^2} + \frac{1}{2}x^{-\frac{1}{2}}$

(d) $f'(x) = 6x^2 - 4 + 3 \ln x - \frac{1}{2}x^{-\frac{1}{2}}$

2. Given $f(x) = \frac{7}{(x^2 + 3)^2}$, find $f'(x)$.

(a) $f'(x) = -14(x^2 + 3)^{-1}(2x)$

(b) $f'(x) = \frac{28x}{x^2 + 3}$

(c) $f'(x) = -14(x^2 + 3)^{-3}(2x)$

(d) $f'(x) = 7 \ln(x^2 + 3)^2$

3. Let $f(t) = 3t^2 - 2t + 1$ represent the position of an object a time t . Find the velocity (instantaneous rate of change) of the object when $t = 3$.

(a) 10

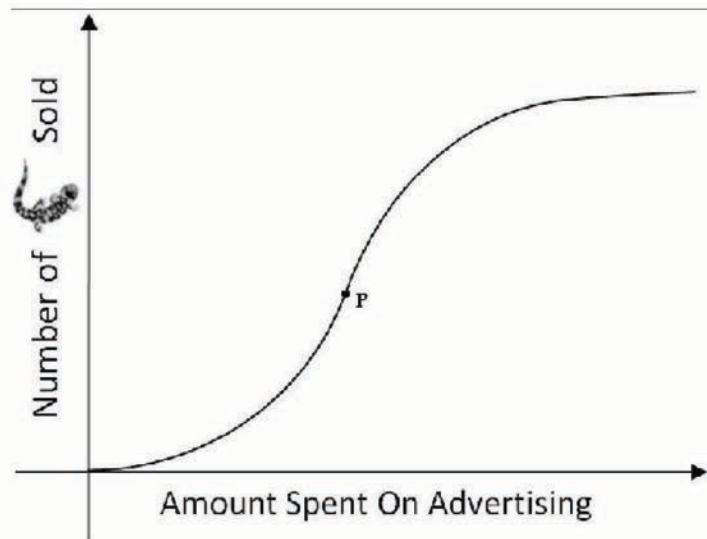
(b) 16

(c) 7

(d) 22

(e) 52

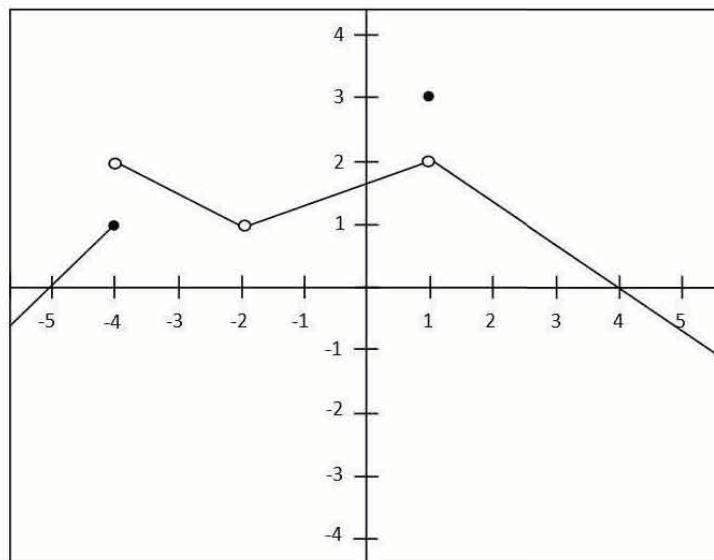
4. The graph below shows a typical response to advertising. After an amount a is spent on advertising, the company sells n units of a product. Sammie's Salamander Shop determines that the number of salamanders sold depends on the amount spent on advertising, as shown below.



Choose the below which best explains what is true about the point **P**.

- (a) The amount spent on advertising is the greatest at the point **P**.
- (b) The number of salamanders sold is the greatest at the point **P**.
- (c) At the point **P**, a small increase in the amount spent on advertising will yield the greatest increase in the number of salamanders sold.
- (d) At the point **P**, a small increase in the number of salamanders sold will yield the greatest increase in the amount spent on advertising.

Use the following graph to answer questions 5 through 9.



5. $\lim_{x \rightarrow 1^-} f(x) =$

- (a) 3
- (b) 2
- (c) does not exist (or undefined)
- (d) none of the above

8. $f(1) =$

- (a) 3
- (b) 2
- (c) does not exist (or undefined)
- (d) none of the above

6. $\lim_{x \rightarrow 1^+} f(x) =$

- (a) 3
- (b) 2
- (c) does not exist (or undefined)
- (d) none of the above

9. $\lim_{x \rightarrow -4^-} f(x) =$

- (a) 1
- (b) 2
- (c) does not exist (or undefined)
- (d) none of the above

7. $\lim_{x \rightarrow 1} f(x) =$

- (a) 1
- (b) 2
- (c) does not exist (or undefined)
- (d) none of the above

10. $\lim_{x \rightarrow 2} \left(\frac{x^2 - 8x + 12}{x - 2} \right) =$

- (a) -6
- (b) 1
- (c) -4
- (d) does not exist (or undefined)
- (e) none of the above

11. $\lim_{x \rightarrow 1} \left(\frac{3x^2 + 2x - 5}{x^2 - 1} \right) =$

- (a) 4
- (b) 10
- (c) 8
- (d) does not exist (or undefined)
- (e) none of the above

12. $\lim_{x \rightarrow 9} \left(\frac{-3 + \sqrt{x}}{x - 9} \right) =$

- (a) $1/9$
- (b) $1/3$
- (c) $1/6$
- (d) does not exist (or undefined)
- (e) none of the above

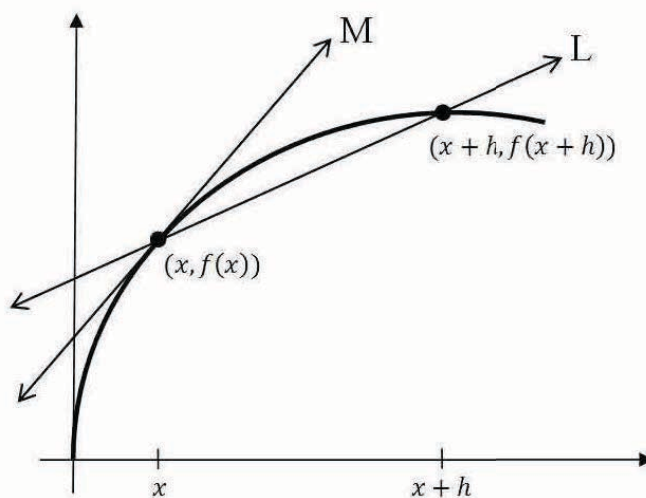
13. Which of the following statements is true?

- (a) $\frac{x^2 + 7x + 10}{x^2 + 9x + 14} = \frac{x + 5}{x + 7}$ and $\lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x^2 + 9x + 14} = \lim_{x \rightarrow -2} \frac{x + 5}{x + 7}$
- (b) $\frac{x^2 + 7x + 10}{x^2 + 9x + 14} \neq \frac{x + 5}{x + 7}$ and $\lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x^2 + 9x + 14} = \lim_{x \rightarrow -2} \frac{x + 5}{x + 7}$
- (c) $\frac{x^2 + 7x + 10}{x^2 + 9x + 14} = \frac{x + 5}{x + 7}$ and $\lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x^2 + 9x + 14} \neq \lim_{x \rightarrow -2} \frac{x + 5}{x + 7}$
- (d) $\frac{x^2 + 7x + 10}{x^2 + 9x + 14} \neq \frac{x + 5}{x + 7}$ and $\lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x^2 + 9x + 14} \neq \lim_{x \rightarrow -2} \frac{x + 5}{x + 7}$
- (e) none of the above

14. What is the slope of the line going through the points $(-1, 4)$ and $(2, 8)$?

- (a) $3/4$
- (b) $4/3$
- (c) 4
- (d) $-3/4$
- (e) none of the above

Use the following graph to answer questions 15 and 16.



15. Which formula below is a formula for the **slope** of the secant line?

- (a) $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{(x+h) - x}$
- (b) $\frac{f(x+h)}{(x+h)}$
- (c) $\frac{f(x+h) - f(x)}{(x+h) - x}$
- (d) $\frac{f(x) - f(x+h)}{(x+h) - x}$
- (e) $\lim_{h \rightarrow 0} \frac{f(x) + h - f(x)}{(x+h) - x}$

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

- (a) $\frac{f(x+h) - f(x)}{(x+h) - x}$
- (b) $\lim_{h \rightarrow 0} \frac{f(x+h)}{(x+h)}$
- (c) $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{(x+h) - x}$
- (d) $\lim_{h \rightarrow 0} \frac{f(x) - f(x+h)}{(x+h) - x}$
- (e) $\frac{f(x) + h - f(x)}{(x+h) - x}$

17. For $f(x) = 2x - 3x^2$, find $\frac{f(x+h) - f(x)}{h}$.
- (a) $2 - 6x - 3h$
 - (b) $1 - 3x - 3h$
 - (c) $2 + 6x + 3h$
 - (d) $-2 + 6x + 3h$
 - (e) $4x - 3h$
18. If $f(x) = 4x + 10$, then $f'(x) =$
- (a) $4x$
 - (b) 2
 - (c) 0
 - (d) 4
 - (e) none of the above
19. Find the equation of the line going through the point $(2, 3)$ with slope $= \frac{-1}{2}$.
- (a) $y = \frac{-1}{2}x + 3$
 - (b) $y = \frac{-1}{2}x + 2$
 - (c) $y = \frac{-1}{2}x + 4$
 - (d) $y = \frac{1}{2}x + 4$
 - (e) none of the above
20. Let $f(x) = (2x - 3)^2$. Find the equation of the tangent line to $f(x)$ at the point $(2, 1)$.
- (a) $y = -4x + 7$
 - (b) $y = 2x - 6$
 - (c) $y = 4x - 7$
 - (d) $y = -2x + 6$
 - (e) none of the above