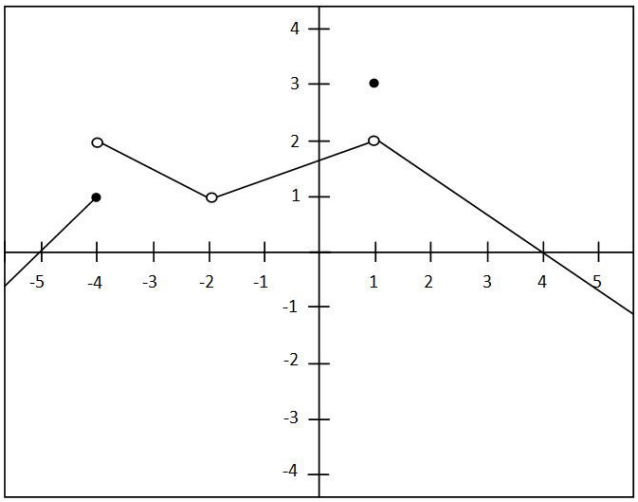
# Exam I – MATH 141 – Summer 2018

## Answer key

**Use the following graph to answer questions 1 through 5.**




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

   (a) 3

   (b) 2

   (c) does not exist (or undefined)

   (d) none of the above

2. $f(1) =$

   (a) 3 (**correct**)

   (b) 2

   (c) does not exist (or undefined)

   (d) none of the above

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

   (a) 1 (**correct**)

   (b) 2

   (c) does not exist (or undefined)

   (d) none of the above

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

   (a) 2 (**correct**)

   (b) 1

   (c) does not exist (or undefined)

   (d) none of the above

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

   (a) 1

   (b) 2

   (c) does not exist (or undefined) (**correct**)

   (d) none of the above

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

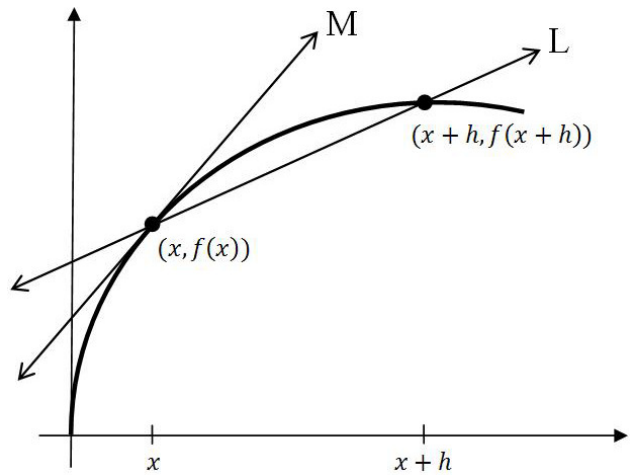
   (a) Yes

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

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

   (d) No, because $\lim_{x \to 1} f(x) \neq f(1)$.(**correct**)

**Use the following graph to answer questions 6 and 7.**




7. Which formula below is a formula for the **slope** of the secant 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) $\dfrac{f(x+h)-f(x)}{h}$
   (**correct**)

8. 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) $\lim\limits_{h\to 0} \dfrac{f(x+h)-f(x)}{h}$
   (**correct**)

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

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

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

9. $\lim_{x \to -5} \left( \frac{x^2 - 25}{x + 5} \right) =$

   (a) -10 (**correct**)
   (b) 0
   (c) -5
   (d) does not exist (or undefined)

10. Let

$$f(x) = \begin{cases} 2x & x < 3 \\ x + 3 & x \geq 3 \end{cases}$$

find $\lim_{x \to 3} f(x)$

   (a) 6 (**correct**)
   (b) 0
   (c) 3
   (d) does not exist

11. For $f(x) = x^2 + 3x$, simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$

   (a) $2x - 3$
   (b) $2xh + h^2 + 3h$
   (c) $2xh + h^2 + 3x$
   (d) $2x + h + 3$ (**correct**)

12. Find the slope of the tangent line to the graph of $f(x) = -2x^3 - 4x + 1$ at the point $(-1, 7)$.

   (a) -1
   (b) 7
   (c) 10
   (d) -10(**correct**)

13. If $f(x) = 11x + 7$, then $f'(x) =$

   (a) $5.5x^2 + 7x$
   (b) 11 (**correct**)
   (c) 7
   (d) $11x$

14. Find $\dfrac{d}{dx}\left((x^2+\dfrac{1}{x})(x^3+3)\right)$

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

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

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

16. Find $\dfrac{d}{dx}(3x^5-2x^4)=$

(a) $5x^4-4x^3$
(b) $-15x^4+8x^3$
(c) $3x^4-2x^3$
(d) $15x^4-8x^3$ (**correct**)

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

(a) $f(-2)=5$ and $f'(-2)=1$
(b) $f(-2)=3$ and $f'(-2)=-1$
(c) $f(-2)=5$ and $f'(-2)=-1$ (**correct**)
(d) $f(-2)=5$, but there is not enough information to determine $f'(-2)$

18. Let $f(x)=2x-x^3$. The equation of the tangent line to $f(x)$ at the point $(2,-4)$ is

(a) $y=-10x+16$ (**correct**)
(b) $y=-10x+2$
(c) $y=2-3x^2$
(d) $y=-4x+16$

19. Find $\dfrac{d}{dx}\left(\dfrac{x^3-1}{2x+3}\right)$

(a) $\dfrac{(3x)(2x)-(x^3-1)(2x+3)}{(2x+3)^2}$

(b) $\dfrac{(3x^2)(2x+3)-2(x^3-1)}{(2x+3)^2}$ (**correct**)

(c) $\dfrac{(3x)(2x)-(x^3-1)(2x+3)}{(2x+3)}$

(d) $\dfrac{2(x^3-1)-(3x^2)(2x+3)}{(2x+3)^2}$

20. Find $\dfrac{d}{dx}\big((x^2+x)^5\big)$

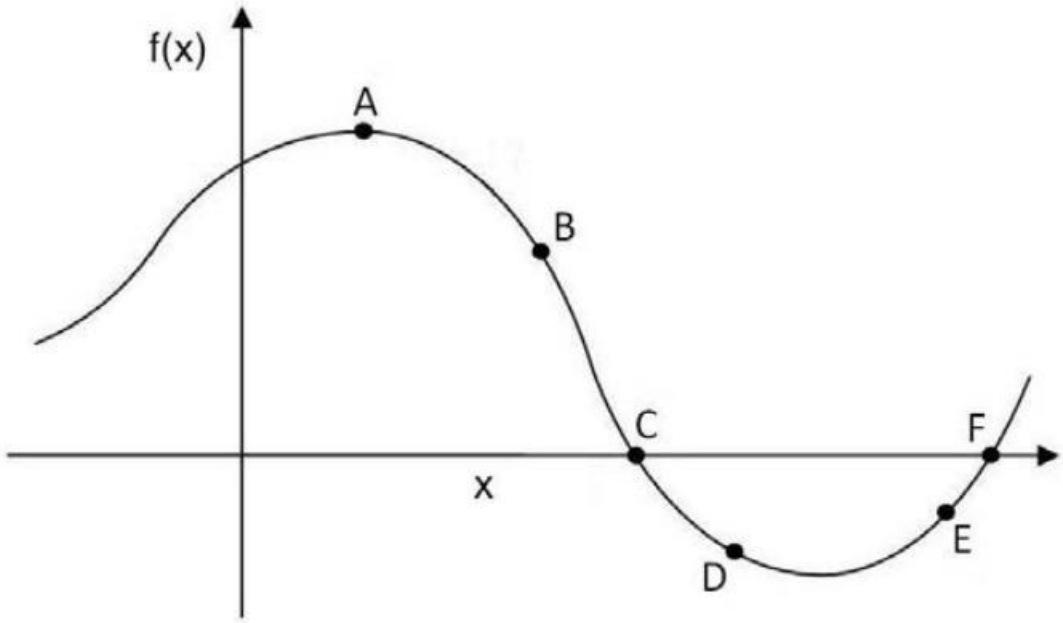
(a) $5(2x+1)^4$

(b) $5(x^2+x)^4(2x+1)^3$

(c) $2x+1$

(d) $5(x^2+x)^4(2x+1)$ (**correct**)

**Use the following graph to answer questions 21 and 22.**




21. Where is $f'(x) > 0$ and $f(x) < 0$

    (a) At point $A$

    (b) At point $F$

    (c) At point $E$ (**correct**)

    (d) At point $D$

22. Where is $f'(x) > 0$ and $f(x) = 0$

    (a) At point $E$

    (b) At point $F$ (**correct**)

    (c) At point $C$

    (d) At point $A$