

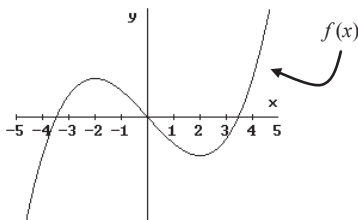
AP Calculus
3.2 Worksheet

All work must be shown in this course for full credit. Unsupported answers may receive NO credit.

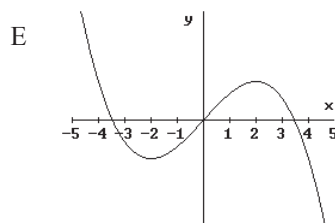
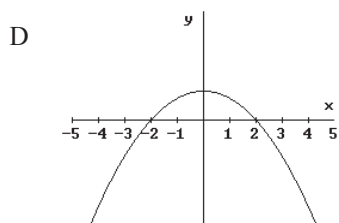
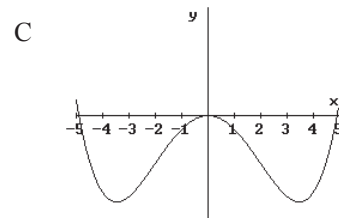
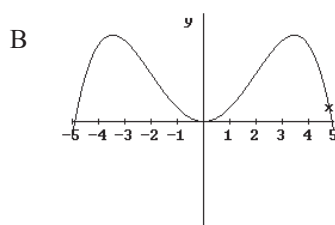
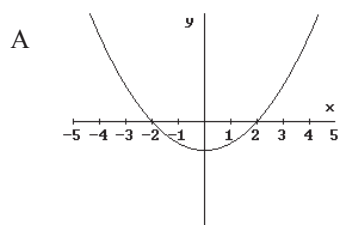
1. If $f(x) = 2 + |x+3|$ for all values of x , then the value of the derivative $f'(x)$ at $x = 3$ is

- A) -1 B) 0 C) 1 D) 2 E) nonexistent

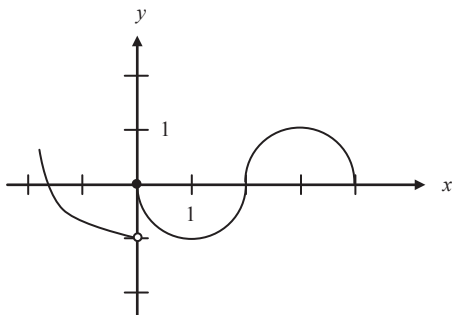
2. The graph of $f(x)$ is shown in the figure below.



Which of the following could be the graph of $f'(x)$?



3. The graph of the function f shown in the figure below has a vertical tangent at the point $(2, 0)$ and horizontal tangents at the points $(1, -1)$ and $(3, 1)$.



For what values of x , $-2 < x < 4$, is f not differentiable?

- A) 0 only B) 0 and 2 only C) 1 and 3 only D) 0, 1, and 3 only E) 0, 1, 2, and 3

4. If f is a function such that $\lim_{x \rightarrow 2} \frac{f(x) - f(2)}{x - 2} = 0$, which of the following must be true?

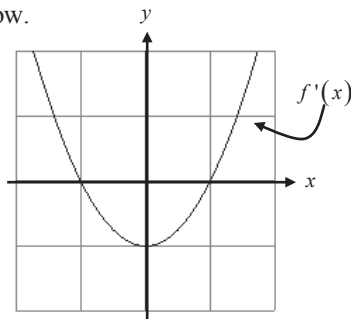
- A) The limit of $f(x)$ as x approaches 2 does not exist.
- B) f is not defined at $x = 2$.
- C) The derivative of f at $x = 2$ is 0.
- D) f is continuous at $x = 0$.
- E) $f(2) = 0$

5. Let f be a function such that $\lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} = 5$. Which of the following must be true?

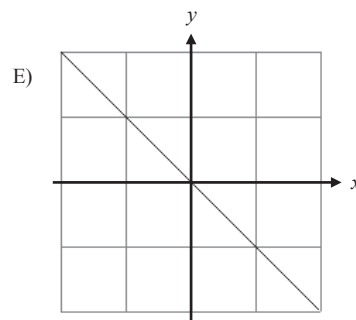
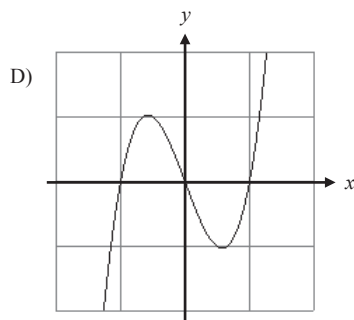
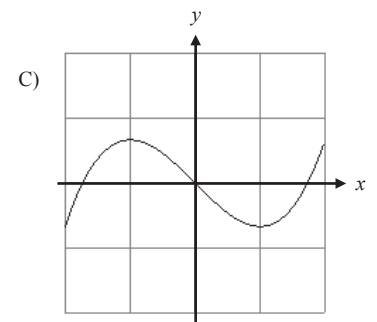
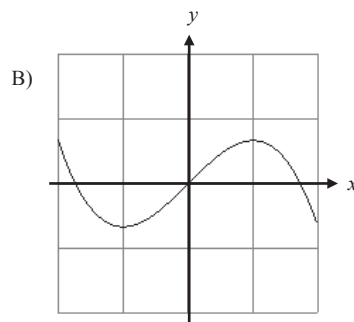
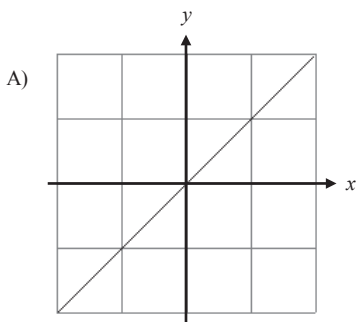
- I. f is continuous at $x = 2$.
- II. f is differentiable at $x = 2$.
- III. The derivative of f is continuous at $x = 2$.

- A) I only
- B) II only
- C) I and II only
- D) I and III only
- E) II and III only

6. The graph of the derivative of f is shown below.



Which of the following could be the graph of f ?

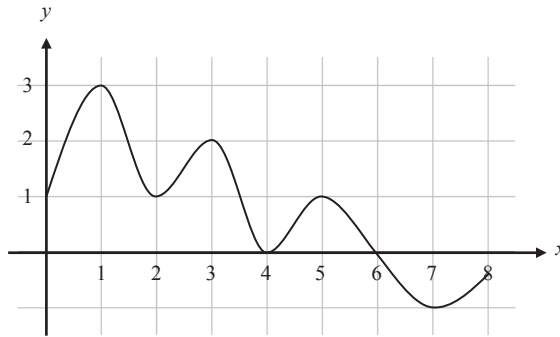


7. Let f be a function that is differentiable on the open interval $(0, 10)$. If $f(2) = -5$, and $f(5) = 5$, and $f(9) = -5$, which of the following must be true?

- I. f has at least 2 zeros.
- II. The graph of f has at least one horizontal tangent line.
- III. For some c , $2 < c < 5$, $f(c) = 3$.

- A) none B) I and II only C) I only D) I and III only E) I, II, and III

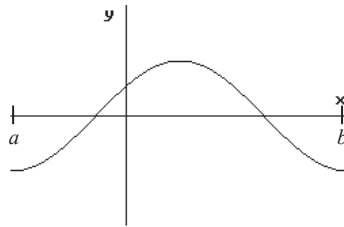
8. The function f is defined on the closed interval $[0, 8]$. The graph of its derivative f' is shown below.



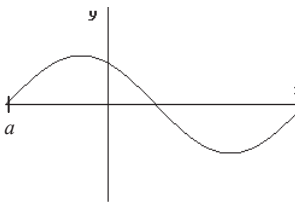
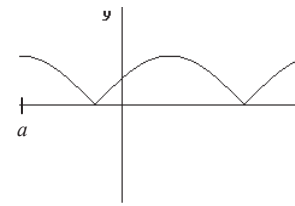
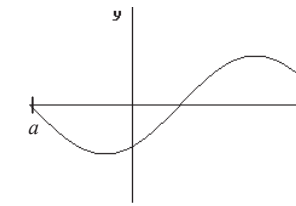
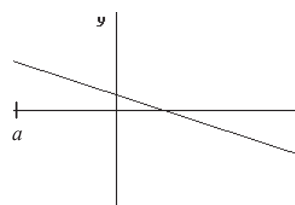
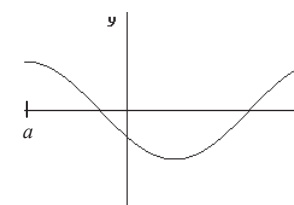
The point $(3, 5)$ is on the graph of $f(x)$. An equation of the tangent line to the graph of f at $(3, 5)$ is

- A) $y = 2$ B) $y = 5$ C) $y - 5 = 2(x - 3)$ D) $y + 5 = 2(x - 3)$ E) $y + 5 = 2(x + 3)$

9. The graph of f is shown below.



Which of the following could be the graph of the derivative of f ?

- A. 
- B. 
- C. 
- D. 
- E. 

10. Complete the following questions from the textbook: pages 114 – 115: #5 – 10, 11 – 16 (calculator), 39

11. Complete the Worksheet: Graphs of f , f' , f'' , and F

AP Calculus
3.3 Worksheet

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1. Solve for a and b in order for $f(x)$ to be both continuous and differentiable at $x = 1$.

$$f(x) = \begin{cases} x^2 + 2 & ; x \leq 1 \\ a\left(x - \frac{1}{x}\right) + b & ; x > 1 \end{cases}$$

2. Solve for a and b in order for $g(x)$ to be both continuous and differentiable at $x = 0$.

$$g(x) = \begin{cases} ax + b & ; x > 0 \\ 1 - x + x^2 & ; x \leq 0 \end{cases}$$

3. For $a - d$, find $f'(2)$ given the following information:

$$\begin{aligned} g(2) &= 3 & g'(2) &= -2 \\ h(2) &= -1 & h'(2) &= 4 \end{aligned}$$

a) $f(x) = 2g(x) + h(x)$

b) $f(x) = 4 - h(x)$

c) $f(x) = g(x)h(x)$

d) $f(x) = \frac{g(x)}{h(x)}$

4. Find all points where the graph of $y = x^4 - 5x^3 - 3x^2 + 13x + 10$ has a horizontal tangent line.

5. Find the equation of the tangent line to the graph of $f(x) = (x^3 - 3x + 1)(x + 2)$ at the point $(1, -3)$.

6. Let $f(x) = (3x^3 + 4x^2)(2x^4 - 5x)$. Find $f'(x)$ without using the product rule first, then using the product rule.

7. An equation of the line tangent to the graph of $y = \frac{2x+3}{3x-2}$ at the point $(1, 5)$ is

- A) $13x - y = 8$ B) $13x + y = 18$ C) $x - 13y = 64$ D) $x + 13y = 66$ E) $-2x + 3y = 13$

8. When $x = 8$, the rate at which $\sqrt[3]{x}$ is increasing is $\frac{1}{k}$ times the rate at which x is increasing. What is the value of k ?

- A) 3 B) 4 C) 6 D) 8 E) 12

9. Let $f(x) = \sqrt{x}$. If the rate of change of f at $x = c$ is twice its rate of change at $x = 1$, then $c =$

- A) $\frac{1}{4}$ B) 1 C) 4 D) $\frac{1}{\sqrt{2}}$ E) $\frac{1}{2\sqrt{2}}$

10. What is the instantaneous rate of change at $x = 2$ of the function f given by $f(x) = \frac{x^2 - 2}{x - 1}$?

- A) -2 B) $\frac{1}{6}$ C) $\frac{1}{2}$ D) 2 E) 6

11. Which of the following is an equation of the tangent line to $f(x) = x^4 + 2x^2$ at the point where $f'(x) = 1$?

- A) $y = 8x - 5$ B) $y = x + 7$ C) $y = x + .763$ D) $y = x - .122$ E) $y = x - 2.146$

12. At what point on the graph of $y = \frac{1}{2}x^2$ is the tangent line parallel to the line $2x - 4y = 3$?

- A) $(\frac{1}{2}, \frac{1}{2})$ B) $(\frac{1}{2}, \frac{1}{8})$ C) $(1, -\frac{1}{4})$ D) $(1, \frac{1}{2})$ E) $(2, 2)$

13. If u , v , and w are nonzero differentiable functions, then the derivative of $\frac{uv}{w}$ is

- A) $\frac{uv' + u'v}{w'}$
B) $\frac{u'v'w - uvw'}{w^2}$
C) $\frac{uvw' - uv'w - u'vw}{w^2}$
D) $\frac{u'vw + uv'w + uvw'}{w^2}$
E) $\frac{uv'w + u'vw - uvw'}{w^2}$

14. Let f be a differentiable function such that $f(3) = 2$ and $f'(3) = 5$. If the tangent line to the graph of f at $x = 3$ is used to find an approximation to a zero of f , that approximation is

- A) 0.4 B) 0.5 C) 2.6 D) 3.4 E) 5.5

15. Complete the following questions from the textbook:

pages 124 – 126 #1 – 9 (odd), 14, 17, 18, 20, 21, 23, 26, 27, 30, 37 – 40, 42, 47, 56