

Match each derivative

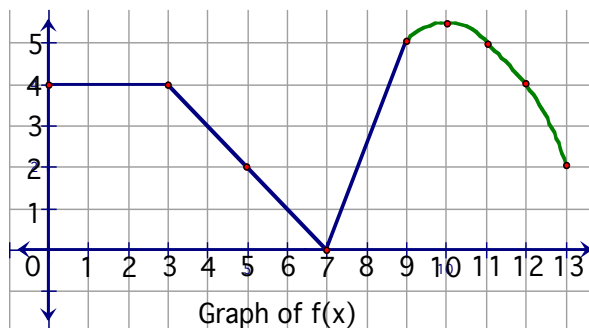
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|--------------------------|----------------------------|
| 1) $f(x) = \tan x$ _____ | a) $f(x) = -\sin x$ |
| 2) $f(x) = \sec x$ _____ | b) $f(x) = -\csc x \cot x$ |
| 3) $f(x) = \csc x$ _____ | c) $f(x) = \sec x \tan x$ |
| 4) $f(x) = \sin x$ _____ | d) $f(x) = \sec^2 x$ |
| 5) $f(x) = \cos x$ _____ | e) $f(x) = -\csc^2 x$ |
| 6) $f(x) = \cot x$ _____ | f) $f(x) = \cos x$ |

7) $f(x) = 3x^2 - 7x + 8$

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|--------------|--|
| a) $f'(x) =$ | c) Equation of the tangent line at $x = 2$ |
| b) $f'(2) =$ | d) Equation of the normal line at $x = 2$ |

Use picture at right for #8

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|--------------------|--|---------------|
| 8 a) $f'(2) =$ | b) $f'(3) =$ | c) $f'(5) =$ |
| d) $f'(8) =$ | e) $f'(9) =$ | f) $f'(10) =$ |
| g) $f'(12) \doteq$ | h) Equation of tangent line at 12
_____ | |



9) $\lim_{h \rightarrow 0} \frac{\tan(x+h) - \tan x}{h} =$

10) $\lim_{h \rightarrow 0} \frac{3(x+h)^7 - 3x^7}{h} =$

11) $\lim_{h \rightarrow 0} \frac{(1+h)^7 - 1}{h} =$

12) $\lim_{h \rightarrow 0} \frac{\cos\left(\frac{\pi}{6} + h\right) - \frac{\sqrt{3}}{2}}{h} =$

Find equation of the tangent line and normal line to the given equation at the given point.

13) $2xy^2 + x = 12$; $(4, -1)$ tangent line

normal line

14) Given: $x^2 - 6x + y^2 + 4y - 12 = 0$ and $\frac{dy}{dx} = \frac{-2x+6}{2y+4}$

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|------------------------------------|----------------------------------|
| a) Find the horizontal tangent(s). | b) Find the vertical tangent(s). |
|------------------------------------|----------------------------------|

15) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. $x^2 - 9y^2 = 7$

$$f(3) = 3$$

$$f'(3) = 7$$

$$f(9) = -2$$

$$f'(9) = 3$$

$$g(3) = -1$$

$$g'(3) = 4$$

$$g(9) = 0$$

$$g'(9) = 6$$

16) Use information above to find $h'(x)$ and $h'(3)$.

a) $h(x) = f(x) \cdot g(x)$

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

c) $h(x) = (f(3x))^3$

Find derivatives for each.

17) $f(x) = \frac{2}{x}$

18) $f(x) = \cos 7x^3$

19) $f(x) = x^{7/9}$

20) $f(x) = \tan(\sec x)$

21) $f(x) = \cot 17x$

22) $f(x) = (\sin 5x)^4$

23) $f(x) = x^2 \sqrt{x^2 - 9}$

24) $f(x) = 3x^3 (5x^2 + 7)^5$

25) $f(x) = \frac{x^2 + 5}{x^3 - 9}$