AP Calculus BC – Unit 2 Extra Practice

2.1 – Extra Practice

Use the limit definition of the derivative to find the derivative:

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

#9b. $r(t) = -t^2 - 4t$

Use the limit definition of the derivative to find the derivative of f(x), then find f'(x) at the given x-value and write the equation of a tangent line to the function at this point of tangency:

#10b. $f(x) = x^2 + 5x - 6$ at $x = 3$

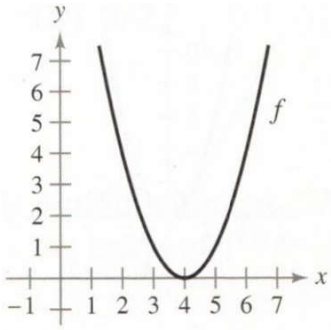
#11b. $f(x) = \sqrt{x-1}$ at $x = 5$

Use the limit definition of the derivative to find the derivative of f(x), then find f'(x) at the given x-value and write the equation of a tangent line to the function at this point of tangency:

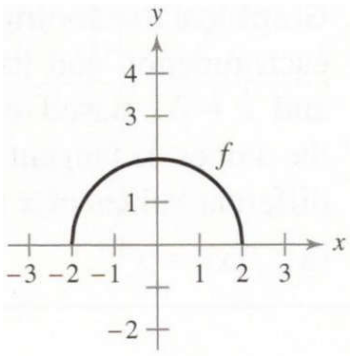
#12b. $f(x)=\dfrac{6}{x+2}$ at $x=0$

Given the graph of f(x), sketch the graph of f'(x) on the same axes:

#13b.



#14b.



#15b. The given limit gives the value of the derivative of a function at a particular

x-value. Identify the function and x-value:

$$\lim_{h\to 0}\frac{\tan 3(x+h)-\tan(3x)}{h}$$

2.2 – Extra Practice

Find the derivative:

#8b. $g(t) = t^2 - \frac{4}{t^3}$

#9b. $f(x) = \frac{2x^4 + 4}{x^3}$

#10b. $g(x) = x^{\frac{1}{4}} - x^{\frac{1}{2}} + 3x$

#11b. $f(x) = 3\sqrt{x} + \sqrt[4]{x} + 5\sqrt[3]{x^2}$

#12b. $g(x) = 3\cos x + 5e^x$

#13b. $f(x) = 7^x + 4\sin x$

#14b. $r(t) = \frac{5t^3 - t^6}{t^4} + \frac{6t}{t^3} - \frac{7t^3}{t^3}$

#15b. $r(t) = \frac{2t^5}{t^3} + \frac{t^2 - 6t}{t^4}$

2.3 – Extra Practice

Find the derivative:

#10b. $g(x)=\left(x^3+2x\right)^3\left(4x-x^3\right)^5$

#11b. $h(x)=\dfrac{x^2}{2\sqrt{x}+1}$

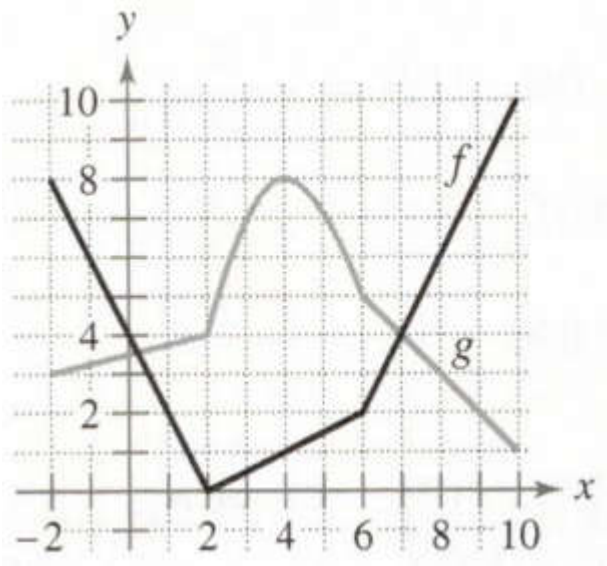
#12b. Find $f'(4)$ for $f(x)=\dfrac{3x^3-5x}{x^2-2}$

#13b. Find $f'(\pi)$ for $f(x)=e^x\cos x$

#13b. Find (and fully simplify) $f'(x)$ for $f(x)=\dfrac{x^2+5x+6}{x^2-4}$

Let $p(x)=f(x)g(x)$ and $q(x)=\dfrac{f(x)}{g(x)}$

If the graphs of $f(x)$ and $g(x)$ are:



#14. Find $p'(4)$

#15. Find $q'(7)$

2.4 – Extra Practice

Find the derivative:

#9b. $y = 5\left(2 - x^3\right)^4$

#10b. $f\left(t\right) = \sqrt{5 - t}$

#11b. $f\left(t\right) = \left(\dfrac{1}{t-3}\right)^2$

#12b. $h\left(t\right) = \left(\dfrac{t^2}{t^3+2}\right)^2$

#13b. $y = \dfrac{e^x - e^{-x}}{2}$

#14b. $f\left(x\right) = \ln\left(\dfrac{2x}{x+3}\right)$

#15b. $y = \ln\left|\csc(x)\right|$

#16b. Write an equation for the tangent line to

$$y = \sqrt[5]{3x^3 + 4x} \text{ at } x = 2$$

#17b. Write an equation for the tangent line to

$$f(x) = 2\tan^3(x) \text{ at } x = \frac{\pi}{4}$$

#18b. Find $f''(x)$ for $f(x) = 6\left(x^3 + 4\right)^3$

#19b. Find $f''(x)$ for $f(x) = \sin\left(x^2\right)$

#20 (hint) First, take the derivative of *g(x)* and remember that the Chain Rule is required.

2.5 – Extra Practice

#6b. Find $\frac{dy}{dx}$ if $2x^3 + 3y^3 = 64$

#7b. Find $\frac{dy}{dx}$ if $x^3y^3 - y = x$

#8b. Find $\frac{dy}{dx}$ if $3e^{xy} - x = y^2$

#9b. Find $\frac{dy}{dx}$ if $xy = 6$

#10b. Find $\frac{d^2y}{dx^2}$ $\left(the\ 2nd\ derivative\right)$ if $x^2 - y^2 = 36$

#11b. Find $\frac{dy}{dx}$ if $y=(1+x)^{\frac{1}{x}}$

#12b. Find $\frac{dy}{dx}$ if $y=\left(\ln(x)\right)^{\ln(x)}$

2.6 – Extra Practice

Find the derivative:

#5b. $f(x) = \arcsin\left(x^2\right)$

#6b. $g(x) = \dfrac{\arccos(x)}{x+1}$

Find the derivative:

#7b. $y = e^{2t}\ln\left(t^2+4\right) - \dfrac{1}{2}\arctan\left(\dfrac{t}{3}\right)$

Find an equation of the tangent line to the graph of the function at the given x-value:

#8b. $y = \dfrac{1}{2}\arccos(x) \qquad x = -\dfrac{\sqrt{2}}{2}$