APCalculusAB
Thursday,September26,2013

TestTOMORROWoverderivatives(chainrule,productrule,powerrule,quotient rule,DEFINITIONofDERIVATIVE!)

Bellwork: Use the DEFINITION OF DERIVATIVE to find the derivative of f(x) = 3-2x². Then, check with a rule.

@ER_FutureOinc

$$f(x)=3-2x^2$$

$$f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$$

$$f'(x)=\lim_{h\to 0}\frac{3-2(x+h)^2-(3-2x^2)}{h}$$

$$f'(x)=\lim_{h\to 0}\frac{\cancel{3}-\cancel{2(x^2}+2xh+h^2)-\cancel{3}+\cancel{2x^2}}{h}$$

$$f'(x)=\lim_{h\to 0}\frac{-4xh-2h^2}{h}$$

$$f'(x)=\lim_{h\to 0}-4x-2h=-4x$$

$$f'(x)=-4x$$

#4 Where is the tangent line to

$$f(x)=\frac{2x^3}{3}-\frac{7x^2}{2}+6x$$ a horizontal line?

$\downarrow m=0$

$$f'(x)=2x^2-7x+6$$

$$2x^2-7x+6=0$$

$$(2x-3)(x-2)=0$$

$2x-3=0$ $\quad$ $x-2=0$

A $x=\frac{3}{2}$ $\quad$ B $x=2$

[redacted]

For each of the following, find the equation of the tangent line at the indicated point. Verify by calculator.

19. $y=\sqrt{x^2+2x+8}$ at $(2,4)$

20. $y=\sqrt[5]{3x^3+4x}$ at $(2,2)$

21. $y=\sqrt{\dfrac{3x-1}{2x+1}}$ at $(-1,2)$

$$y=(x^2+2x+8)^{1/2}$$

$$y'=\frac{1}{2}(x^2+2x+8)^{-1/2}(2x+2)$$

$$y'=\frac{x+1}{\sqrt{x^2+2x+8}}$$

@ (2,4) → plug in x=2 to find slope.

$$y'(2)=\frac{2+1}{\sqrt{2^2+2\cdot 2+8}}$$

$$y'(2)=\frac{3}{\sqrt{16}}=\frac{3}{4}$$

$$y-4=\frac{3}{4}(x-2)$$

Given the following information, find the value of the derivative of the functions at $x = 3$. Be careful, not all the information is needed to calculate these. Answers are next to the problem.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	1	8	-3	-5
6	3	-2	4	5
8	-1	3	π	4
1	2	-6	5	0

22. $f(x)+g(x)$ (Ans: -8)

$f'(x)+g'(x)$

$f'(3)+g'(3)$

$-3+-5=-8$

23. $f(x)g(x)$ (Ans: -29)

24. $\dfrac{f(x)}{g(x)}$ (Ans: $\dfrac{-19}{64}$)

25. $\dfrac{g(x)}{f(x)}$ (Ans: 19)

26. $(f(x))^2$ (Ans: -6)

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$2(f(x))^1 \cdot f'(x)$

$2(f(3)) \cdot f'(3)$

$2 \cdot 1 \cdot -3 = -6$

27. $\dfrac{1}{g(x)}$ (Ans: $\dfrac{5}{64}$)

$(g(x))^{-1}$

$-1 \cdot (g(x))^{-2} \cdot g'(x)$

$-1 \cdot 8^{-2} \cdot -5$

28. $\sqrt{f(x)}$ (Ans: $\dfrac{-3}{2}$)

29. $\sqrt{f(x)+g(x)}$ (Ans: $\dfrac{-4}{3}$)

30. $f^3(x)g(x)$ (Ans: -77)

30 $\boxed{f^3(x)}g(x)$

$f^3(x) \cdot g'(x) + g(x) \cdot 3(f(x))^2 \cdot f'(x)$

$1^3 \cdot -5 + 8 \cdot 3 \cdot 1^2 \cdot -3$

$-5-72$

-77

$y = x^2-4x-2$

$y' = 2x-4$

$y'(0) = -4 \rightarrow$ slope of tangent line @ $x=0$.

$-1 \rightarrow \frac{1}{4}$

$y = \frac{1}{4}x-2$ eqn of normal line

$y+2 = \frac{1}{4}(x-0)$