Calculus AB (Chain Rule Practice) _____

❖ Fill in the derivative rules for numbers 1 – 5.

How is my deriving?

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1. Power Rule: $\frac{d}{dx}\left[a \cdot x^n\right] =$ _____

2. Product Rule: $\frac{d}{dx}\left[f(x) \cdot g(x)\right] =$ _____

3. Quotient Rule: $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] =$ _____

4. Derivatives of Trig Functions:

$\frac{d}{dx}\left[\sin x\right] =$ _____ $\frac{d}{dx}\left[\cos x\right] =$ _____

$\frac{d}{dx}\left[\tan x\right] =$ _____ $\frac{d}{dx}\left[\cot x\right] =$ _____

$\frac{d}{dx}\left[\sec x\right] =$ _____ $\frac{d}{dx}\left[\csc x\right] =$ _____

5. Chain Rule:

$\frac{d}{dx}\left[f(g(x))\right] =$ _____

$\frac{d}{dx}\left[f(g(h(x)))\right] =$ _____

6. Describe how you know when to use the product rule, the quotient rule, and the chain rule.

❖ Find the derivatives of the following:

7. $y=(3x+8)^7$

8. $y=(5x^2-4)^{13}$

9. $y=3(x^2+5x-9)^{10}$

10. $y=8(3-5x)^6$

11. $y=\dfrac{1}{7x+5}$

12. $y=\dfrac{-2}{(x^3+11)^7}$

13. $y=\sqrt{3x^2+7x-2}$

14. $y=\sqrt[3]{7x^4+11}$

15. $y=\sin(4x^2+37)$

16. $y=\cos(-5x^4-19)$

17. $f(x)=6\tan(8x+51)$

18. $g(x)=-5\sec(2x^2-7)$

19. $y=\cos^5(x^3+45)$

20. $f(x)=2\cot^3(3-7x)$

21. $g(x)=-10\cos(3x^4+7x)$

❖ Use the table below to answer questions 22 – 24.

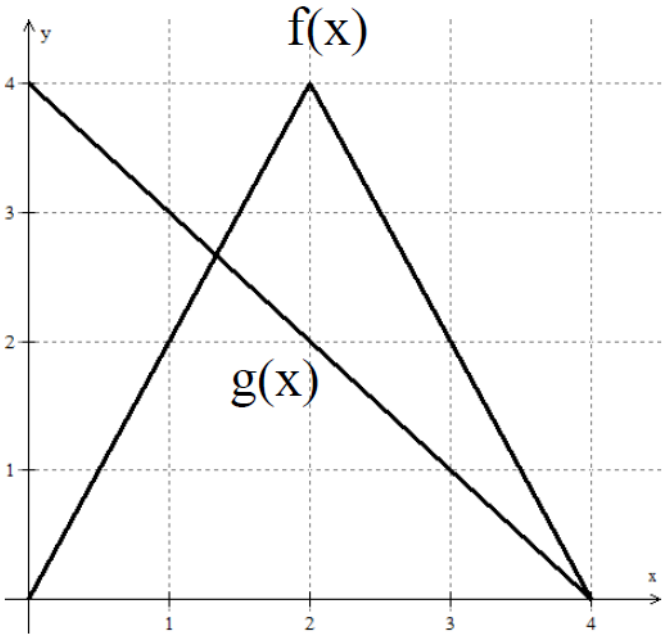
x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	1	8	-3	-5
6	3	-2	4	5
8	-1	3	π	4
1	2	-6	5	0

22. If $h(x)=f(g(x))$, find $h'(3)$

23. If $p(x)=g(g(x))$, find $p'(3)$

24. If $r(x)=g(f(x))$, find $r'(3)$

❖ Use the graphs of the functions f and g below to answer questions 25 – 32.



25. Let $h(x) = f(x) \cdot g(x)$. Find:

(a) $h'(1)$ (b) $h'(2)$ (c) $h'(3)$

26. Let $k(x) = \dfrac{f(x)}{g(x)}$. Find:

(a) $k'(1)$ (b) $k'(2)$ (c) $k'(3)$

27. Let $w(x) = \dfrac{g(x)}{f(x)}$. Find:

(a) $w'(1)$ (b) $w'(2)$ (c) $w'(3)$

28. Let $h(x) = f(g(x))$. Find:

(a) $h'(1)$ (b) $h'(2)$ (c) $h'(3)$

29. Let $u(x) = g(f(x))$. Find:

(a) $u'(1)$ (b) $u'(2)$ (c) $u'(3)$

30. Let $v(x) = f(f(x))$. Find:

(a) $v'(1)$ (b) $v'(2)$ (c) $v'(3)$

31. Let $r(x) = g(g(x))$. Find:

(a) $r'(1)$ (b) $r'(2)$ (c) $r'(3)$

32. Let $p(x) = (f(x))^3$. Find:

(a) $p'(1)$ (b) $p'(2)$ (c) $p'(3)$