4.2 Inverse Derivatives

Calculus   Name: _____

Find the following.

1. $\dfrac{d}{dx}\sin^{-1}(8x)$

2. $\dfrac{d}{dx}\sec^{-1}(x^2)$

3. $\dfrac{d}{dx}\cot^{-1}(2x)$

4. $\dfrac{d}{dx}\sin^{-1}(-x^2)$

5. $\dfrac{d}{dx}\tan^{-1}(6x^3)$

6. $\dfrac{d}{dx}\cos^{-1}(2x^5)$

7. $\dfrac{d}{dx}\csc^{-1}(x^3)$

8. Anti-derivative of $f'(x) = -\dfrac{6x^2}{\sqrt{1-4x^6}}$

9. Anti-derivative of $f'(x) = \dfrac{20x^4}{1+16x^{10}}$

10. Anti-derivative of $f'(x) = -\dfrac{2}{x\sqrt{4x^4-1}}$

11. Anti-derivative of $f'(x) = \dfrac{3}{\sqrt{1-9x^2}}$

12. $\dfrac{d}{dx}\sec^{-1}(x^5)$

13. $\dfrac{d}{dx}\cos^{-1}(7x^3)$

14. $\dfrac{d}{dx}\tan^{-1}(3x)$

The functions f and g are differentiable. For all x, $f(g(x)) = x$ and $g(f(x)) = x$.	
15. If $f(7) = -2$ and $f'(7) = -1$, find $g(-2)$ and $g'(-2)$.	16. If $g(-5) = 1$ and $g'(-5) = 6$, find $f(1)$ and $f'(1)$.
17. If $g(6) = 8$ and $g'(6) = -3$, find $f(8)$ and $f'(8)$.	18. If $f(-1) = -4$ and $f'(-1) = 3$, find $g(-4)$ and $g'(-4)$.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	-2	5	-5	-4
-2	-3	6	-6	-3
-3	-6	-4	-5	-6
-4	-1	-9	-3	-1
-5	-4	-1	-2	-2
-6	-5	-2	-1	-5

f and g are differentiable functions. Using the table above, find the following. f and g are NOT inverses!

19. $g^{-1}(-1)$	20. $f^{-1}(-5)$	21. $\frac{d}{dx}g^{-1}(-2)$

22. $\frac{d}{dx}f^{-1}(-3)$

23. Find the line tangent to the graph of $f^{-1}(x)$ at $x = -3$

Answers to 4.2 CA #1

1. $\frac{8}{\sqrt{1-64x^2}}$	2. $\frac{2}{x\sqrt{x^4-1}}$	3. $-\frac{2}{4x^2+1}$	4. $-\frac{2x}{\sqrt{1-x^4}}$	5. $\frac{18x^2}{36x^6+1}$	6. $-\frac{10x^4}{\sqrt{1-4x^{10}}}$	7. $-\frac{3}{|x|\sqrt{x^6-1}}$

8. $\cos^{-1}(2x^3) + C$	9. $\tan^{-1}(4x^5) + C$	10. $\csc^{-1}(2x^2) + C$	11. $\sin^{-1}(3x) + C$	12. $\frac{5}{|x|\sqrt{x^{10}-1}}$

13. $-\frac{21x^2}{\sqrt{1-49x^6}}$	14. $\frac{3}{9x^2+1}$	15. $g(-2) = 7$ $g'(-2) = -1$	16. $f(1) = -5$ $f'(1) = \frac{1}{6}$	17. $f(8) = 6$ $f'(8) = -\frac{1}{3}$	18. $g(-4) = -1$ $g'(-4) = \frac{1}{3}$

19. -6	20. -6	21. $-\frac{1}{2}$	22. $\frac{1}{6}$	23. $y + 2 = \frac{1}{6}(x + 3)$