Calculus Review
Chapter 5b

5.3: Inverse Functions

1. Given $f(x)=5x+3$ and $g(x)=\frac{x-3}{5}$, prove that f(x) and g(x) are inverses of each other.

2. Is $f(x)=\frac{1}{5}x^5+10x-7$ monotonic? Explain.

3. Given $f(x)=\ln(x-1)$, find $f^{-1}(x)$. Then, sketch both functions.

4. Given $f(x)=x^7+2x+9$. If $f(x)$ and $g(x)$ are inverses, find g'(6).

5. Given $f(x)=\sqrt{x^3+x^2+x+1}$, find $(f^{-1})'(2)$.

6. $f(x)=\frac{x+3}{x+1}, x>-1$, find $(f^{-1})'(2)$.

Use the following table, which shows the values of differentiable functions f and g.

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

7. If $H(x)=f^{-1}(x)$, find $H'(3)$

8. If $T(x)=g^{-1}(x)$, find the equation of the tangent line for T(x) at x = 2.

5.6: Inverse trigonometric functions: Differentiation

Evaluate.

9. $\arctan(-\sqrt{3})$

10. $\operatorname{arccot}(-\sqrt{3})$

11. $\operatorname{arccsc}(\sqrt{2})$

12. $\sin(\arctan 2)$

13. $\cot(\operatorname{arccsc} x)$

Differentiate. Simplify the derivative.

14. $f(x)=\arccos(x^3)$

15. $f(x)=arc\sec\left(\frac{x}{2}\right)$

16. $f(x)=arc\csc 2x$

Write an equation of the line tangent to the function at x = -5.

17. $f(x)=arccot\frac{x}{5}$

5.7: Inverse Trigonometric Functions: Integration

Evaluate.

18. $\int_0^{\sqrt{3}/4} \frac{dx}{1+16x^2}$

19. $\int_{1/2}^{\sqrt{3}/2} \frac{5dx}{\sqrt{1-x^2}}$

20. $\int \frac{7x}{x^4+25}\ dx$

21. $\int \frac{4}{\sqrt{-x^2+8x}}dx$

22. $\int \frac{e^{2x}}{\sqrt{16-e^{4x}}}dx$

23. $\int_0^1 \frac{x+1}{x^2+1}dx$

24. $\int_0^1 \frac{x+1}{\sqrt{4-x^2}}dx$

25. $\int_0^{\pi/2} \frac{\cos x}{1+\sin^2 x}dx$

26. $\int \frac{dx}{x^2-10x+30}$

27. $\int_0^4 \frac{x}{1+x^2}dx$