

Math 2215 - Calculus 1

Exam #6 - 2016.11.30

Name: _____

$$\begin{aligned} \frac{d}{dx} \sin^{-1}(x) &= \frac{1}{\sqrt{1-x^2}} & \frac{d}{dx} \cos^{-1}(x) &= -\frac{1}{\sqrt{1-x^2}} & \frac{d}{dx} \tan^{-1}(x) &= \frac{1}{1+x^2} \\ \frac{d}{dx} \cot^{-1}(x) &= -\frac{1}{1+x^2} & \frac{d}{dx} \sec^{-1}(x) &= \frac{1}{|x|\sqrt{x^2-1}} & \frac{d}{dx} \csc^{-1}(x) &= -\frac{1}{|x|\sqrt{x^2-1}} \\ \frac{d}{dx} \sinh^{-1}(x) &= \frac{1}{\sqrt{1+x^2}} & \frac{d}{dx} \cosh^{-1}(x) &= \frac{1}{\sqrt{x^2-1}} & \frac{d}{dx} \tanh^{-1}(x) &= \frac{1}{1-x^2} \\ \frac{d}{dx} \coth^{-1}(x) &= \frac{1}{1-x^2} & \frac{d}{dx} \operatorname{sech}^{-1}(x) &= -\frac{1}{x\sqrt{1-x^2}} & \frac{d}{dx} \operatorname{csch}^{-1}(x) &= -\frac{1}{|x|\sqrt{x^2+1}} \end{aligned}$$

1. Compute the following integral: $\int \frac{\sin(\ln(2x))}{x} dx$
2. Compute the following derivative: $\frac{d}{dx} \sin(x^2)^{\cos(x)+x}$
3. Derive the formula for $\frac{d}{dx} \tan^{-1}(x)$ by the method of implicit differentiation.
4. Verify algebraically that $\cosh^2(x) - \sinh^2(x) = 1$.
5. Compute the following integral: $\int 3x \tanh(x^2) dx$
6. Compute the following derivative: $\frac{d}{dx} \ln \left(\frac{(5x-1)^2(3x+2)^5}{(4x-7)^6(3x-2)^7} \right)$.
7. Compute the following integral: $\int \frac{9x}{x^2\sqrt{1-x^4}} dx$
8. Compute the following derivative: $\frac{d}{dx} \log_7(2^{3x} - 4^{5x} + 1)$.
9. If $f(x) = x^3 + 3x^2 + 4x - 1$, verify that $f(x)$ is invertible by showing that $f'(x) > 0$ for all x . Then compute $\frac{d}{dx} f^{-1}(x)$ at $x = 7$.