

Math 2315 - Calculus 2

Cumulative Quiz #2 - 2021.02.08

Name: _____

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

1. Compute the following integral: $\int \frac{\sin(\ln(2x))}{x} dx$
2. Derive the formula for $\frac{d}{dx} f^{-1}(x)$ by the method of implicit differentiation.
3. Compute the following integral: $\int 3x \tanh(x^2) dx$
4. Compute the following integral: $\int \frac{9x}{x^2\sqrt{1-x^4}} dx$
5. State the *domains* and *ranges* of the three functions $\sin^{-1}(x)$, $\cos^{-1}(x)$ and $\tan^{-1}(x)$.
6. Evaluate each of the following:
 - (a) $\sin^{-1}\left(\frac{1}{2}\right)$
 - (b) $\tan^{-1}(\sqrt{3})$
 - (c) $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$
7. Compute the following derivative: $\frac{d}{dz} \operatorname{sech}^{-1}(\cos(z))$
8. Determine the values z such that $\frac{1}{\cos(z)\sqrt{1-\cos^2(z)}} \sin(z) = \sec(z)$
9. Compute the following limit: $\lim_{x \rightarrow 1} \frac{x-1}{\sqrt{10-x}-3}$
10. Compute the following integral: $\int_0^{\frac{\pi}{4}} \tan^3(x) \sec^2(x) dx$