

Math 222 Exam 1 Review Problems

Name: _____

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Directions: Work in groups to complete the following problems.

1. Differentiate

- (a) $f(x) = \sqrt{e^{3x}}$
- (b) $g(x) = \ln(\cos(x))$
- (c) $h(x) = \operatorname{sech}(x)$
- (d) $f(x) = x^{\arctan(x)}$
- (e) $g(x) = 3^{x^4}$
- (f) $h(x) = x^{e^x}$
- (g) $f(x) = \cosh(\cos(\arctan(x)))$

2. Evaluate

- (a) $\int \cot(x) dx$
- (b) $\int_0^1 x e^{x^2} dx$
- (c) $\int \sinh^2(x) dx$
- (d) $\int -\frac{1}{\sqrt{16-x^2}} dx$

3. True or False:

$$\sinh(x) + \cosh(x) = \frac{1}{\sinh(x) - \cosh(x)}$$

4. Let $f(x) = e^{\sqrt{x}}$

- (a) Show algebraically that $f(x)$ is one to one.
- (b) Find $f^{-1}(x)$ and give its domain.
- (c) Find $(f^{-1})'(e)$ two ways, 1st by taking the derivative of the equation in part b and 2nd by using the formula derived in class for the derivative in terms of $f(x)$.

5. Evaluate $\tan(\arcsin(\frac{1}{2}))$

6. Use L'Hospital's rule to verify the identity $\lim_{x \rightarrow 0^+} (1+x)^{\frac{1}{x}} = e$