

score	possible	problem
	10	1
	30	2
	30	3
	15	4
	15	5
	100	

Name: _____

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Work in groups of 3 or 4. Show your work. Acknowledge any help on these specific problems.

- /10 1. (a) State L'Hôpital's Rule. Identify its assumptions (hypotheses) and its conclusions.

2. Compute the following limits:

/10 (a) $\lim_{t \rightarrow 0} \frac{e^{2t} - 1}{\sin(t)} =$

/10 (b) $\lim_{x \rightarrow \infty} x^3 e^{-x^2} =$

/10 (c) $\lim_{x \rightarrow 0} \frac{x3^x}{3^x - 1} =$

3. Compute the following derivatives:

/10 (a) $\frac{d}{dx} \sqrt{\arctan(3x)} =$

/10 (b) $\frac{d}{dx} \cos(\cosh(\cos^{-1}(x))) =$

/10 (c) $\frac{d}{dx} \frac{\cot^{-1}(1+x^2)}{\operatorname{sech}(5x)} =$

/15 4. Prove that $\frac{d}{dx} (\cot^{-1}(x)) = -\frac{1}{1+x^2}$.

/15 5. Show that $\cosh^2(x) - \sinh^2(x) = 1$.