



Math 181
Recitation Quiz 6 (3.3, 3.5 – 3.7)

Full Name _____
Full Name _____
Full Name _____
Date _____

Open notes, open book. No more than 3 per group.
Each student is responsible for all questions, do not assign questions to individual group members.
All questions worth 10 points except where noted. Most questions come directly from homework.
No work = No credit.

1. Differentiate the following, you do not need to simplify

a) $f(x) = \frac{\ln x}{1 + \ln(2x)}$

b) $y = \frac{e^x - e^{-x}}{e^x + e^{-x}}$

c) $y = \tan^{-1}(x - \sqrt{1 + x^2})$

2. Find the equation for the tangent line to the curve $y = \frac{e^x}{x}$ at the point $x = 1$

3. Prove $\frac{d}{dx}(\coth x) = -\operatorname{csch}^2 x$ by either method of your choice:

a) using the definition $\coth x = \frac{\cosh x}{\sinh x}$

b) using the definitions $\coth x = \frac{e^x + e^{-x}}{e^x - e^{-x}}$ and $\operatorname{csch} x = \frac{2}{e^x - e^{-x}}$.

4. Find the numerical value of $\operatorname{sech}(0)$ and $\cosh^{-1}(1)$ using the definitions.

5. Prove $\cosh x - \sinh x = e^{-x}$.

6. Find the derivative of $y = e^x \tanh^{-1}(x^3 - 1) + \ln \sqrt[3]{x^2 - 1}$. Specify the domain of y .

7. Find the limit of $\lim_{x \rightarrow 0} \frac{\cos mx - \cos nx}{x^2}$ using L'Hopital's rule.

8. Find the limit of $\lim_{x \rightarrow 1} \left(\frac{1}{\ln x} - \frac{1}{x-1} \right)$ using L'Hopital's rule.

9. Find the limit of $\lim_{x \rightarrow 0^+} \sin x \ln x$ using L'Hopital's rule.

10. Find the limit of $\lim_{x \rightarrow \infty} \left(1 + \frac{a}{x} \right)^{bx}$ using L'Hopital's rule.