

Math 1232: Single-Variable Calculus 2
George Washington University Spring 2023
Recitation 3

Jay Daigle

February 2, 2024

Problem 1. (a) Compute $\sin(\arctan(5))$.

(b) Compute $\frac{d}{dx} \arccos(\sqrt{x})$

(c) Compute $\frac{d}{dx} \arctan(x + \sec(x))$

Problem 2. Compute the following integrals:

(a) $\int \frac{\arcsin(x)}{\sqrt{1-x^2}} dx$.

(b) $\int_0^1 \frac{e^{2x}}{1+e^{4x}} dx$.

(c)

Problem 3. (a) In class, we saw that $\lim_{x \rightarrow +\infty} \frac{\ln(x)}{x} = 0$. What is $\lim_{x \rightarrow +\infty} \frac{\ln(x^2)}{x}$?

(b) Compute $\lim_{x \rightarrow +\infty} \frac{\ln(x^n)}{x}$ for $n > 0$.

(c) Compute $\lim_{x \rightarrow +\infty} \frac{\ln(x)}{x^\epsilon}$ for $\epsilon > 0$.

(d) What do parts (a-c) tell you about the relationship between polynomials and $\ln(x)$?

(a) In class we saw that $\lim_{x \rightarrow +\infty} \frac{e^x}{x} = +\infty$. Compute $\lim_{x \rightarrow +\infty} \frac{e^x}{x^2}$.

(b) Compute $\lim_{x \rightarrow +\infty} \frac{e^x}{x^n}$ for $n > 0$.

(c) What do parts (e-f) tell you about the relationship between e^x and polynomials?

Problem 4. (a) We want to compute $\lim_{x \rightarrow \pi/2} \sec(x) - \tan(x)$.

(b) Can we use L'Hospital's Rule on this as written? Can we change it to a form where L'Hospital's Rule works?

(c) What is the limit?

Problem 5. Let's compute $\lim_{x \rightarrow 0^+} x^{\frac{1}{\ln(x)-1}}$

(a) What indeterminate form is this?

(b) If $y = x^{\frac{1}{\ln(x)-1}}$, what is $\ln |y|$?

(c) Compute $\lim_{x \rightarrow 0^+} \ln |y|$.

(d) Compute $\lim_{x \rightarrow 0^+} x^{\frac{1}{\ln(x)-1}}$.