MATH 20A
PRACTICE MIDTERM #2

Instructions

• Read each question carefully, and answer each question completely.
• Show all of your work. No credit will be given for unsupported answers.
• Write your solutions clearly and legibly. No credit will be given for illegible solutions.
1. Evaluate the following derivatives

(a) (6 points) \( \frac{d}{dt} \frac{2^t}{\sinh(t) + 1} \).

(b) (6 points) \( \frac{d^2}{dx^2} \cos(\pi x - \pi) \).

(c) (6 points) \( g'(\ln(2) + \tan^{-1}(2)) \), where \( g(\theta) = f^{-1}(\theta) \) and \( f(\theta) = \ln(\theta) + \tan^{-1}(\theta) \).
2. (6 points) A ladder which is 13 m tall is sliding down a wall. Suppose the top of the ladder is sliding down the wall at 0.5 m/s. At what rate is the bottom of the ladder sliding away from the wall when it is 5 m away from the wall? Do not forget to include units of measurement in your final answer.
3. Let $f(x) = x(x - 2)^2$.

(a) (3 points) Find all the critical points of $f(x)$ and use the first derivative test to determine whether each critical point is a local maximum or a local minimum.

(b) (3 points) Find the maximum and minimum values of $f(x)$ on the interval $[-1, 1]$. 


4. Let $f(x) = \cos(x)$.

(a) (3 points) Evaluate $f(\pi/3 - \pi/4 + 2\pi)$ exactly.

(b) (3 points) Find the linearization $L(x)$ for the function $f(x)$ at the point $a = \pi/3 - \pi/4 + 2\pi$. 