INTRODUCTION TO CALCULUS

MATH 1A

Unit 15: Worksheet

Problem 1) TF questions (20 points) No justifications are needed.

1) T F The function $f(x) = \text{sinc}(x) - 1$ has a root at $x = 0$.

2) T F The function $f(x) = \tan(x^2)$ is continuous everywhere.

3) T F $\sin(3\pi/4) = 1$.

4) T F $f(x) = 1/(x^2 - 1))$ is differentiable everywhere.

5) T F The chain rule assures that $\frac{d}{dx} \log(\tan(x)) = 1/\tan(x) 1/\cos^2(x)$.

6) T F The wobbly table theorem follows from the mean value theorem

7) T F $\cosh(x) = (e^x + e^{-x})/2$ is differentiable.

8) T F $\arccos(x)$ is the inverse function of $\cos(x)$.

9) T F $g(x) = \sqrt{x}$ is the inverse function of $f(x) = x^2$.

10) T F The Newton step of $f(x) = x^3$ is $T(x) = x - x^3/3x^2$.

11) T F $\sin(3\pi/2) = -1$.

12) T F $f(x) = \tan(x)$ has a vertical asymptote at $x = 0$.

13) T F $\log(x) + x$ takes the value 5 at some point.

14) T F If $f(x) = x$, then $Df(x) = f(x + 1) - f(x) = 1$.

15) T F The mean value theorem has Rolles theorem as a special case

16) T F The function $\sin(1/x)$ is continuous everywhere.

17) T F $\arcsin'(x) = 1/\sqrt{1 - x^2}$.

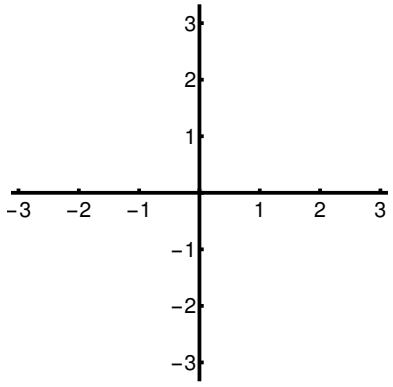
18) T F $\log'(x^2) = 2/x$.

19) T F A continuous function always has a minimum on $[0, 1]$.

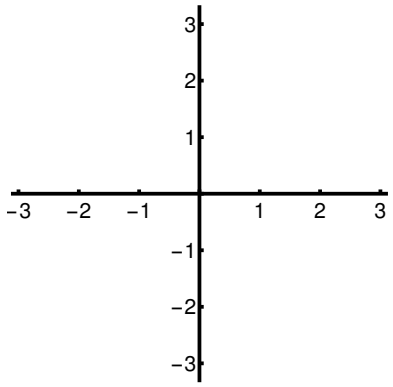
20) T F High D low minus low D high, cross the line and square the low

Problem 2) Functions (10 points)

a) (5 points) Draw the exponential function $\exp|x|$.
Make sure you get the roots and asymptotes correct.



b) (5 points) Draw the graph of the cot-function $f(x) = \cot(x)$.
Make sure you get the roots and asymptotes correct.



Problem 3) Extrema (10 points)

a) (4 points) Find all the critical points of the function $f(x) = \exp(x)x^2$.
b) (4 points) Use the second derivative test to classify the critical points.
c) (2 points) On the interval $[-10, 10]$, where it the global maximum, where the global minimum?