# Notes on September 4, 2019

MATH 4665/4875/7140/7300

Instructor: Prof. Tim Sheng

## A Quick Calculus Review and Beyond

1. Functions
2. Derivatives
3. Partial Derivatives
4. Antiderivatives
5. Finite Difference Approximations
6. Ordinary Differential Equations
7. Partial Differential Equations
8. More on Finite Difference Approximations
9. Matlab and other Software Platforms

*Problems:*

1. For what values of $a, m, b$ does the function

$$f(x) = \begin{cases} 3, & x = 0, \\ -x^2 + 3x + a, & 0 < x < 1, \\ mx + b, & 1 \le x \le 2, \end{cases}$$

   safisfy the hypothese of the Mean Value Theorem on the interval $[0, 2]$?

2. Evaluate the integral

$$I = \int_0^{\pi/6} \tan(2x) dx.$$

3. Find the antiderivative of the function

$$y = \phi(t) = \sqrt{\frac{1}{t(t+1)}}$$

   within its domain.

## References

[1] Robert A. Adams et al., *Calculus – Single Variable,* 8th Ed., Pearson, 2014.

[2] Rudra Pratap, *Getting Started with Matlab: A Quick Introduction for Scientists and Engineers,* 7th Ed., Oxford Univ. Press, 2016.