Calculus 2

Calculus Properties of functions of one variable — continued.

1823 → Differential Calculus

2423 → Integral Calculus

The principal object of study is the integral of $f(x)$ over the interval $[a,b]$.

This is a number designated by

$$\int_a^b f(x)\,dx$$

In the course we'll address:

① What does the integral represent? What makes it interesting?

some answers: area, average values, arclength, volumes, mass, work

② How can integrals be computed?

Techniques of integration?

Calculations are related to finding derivatives but much more complicated.

③ Our studies allow us to enlarge the class of "elementary" functions.

1823 power functions, polynomials rational functions, trig functions.

2423 logarithm and exponential functions, inverse trig functions.

Course Structure

Grading:

Classwork – 15%

Webwork – 15%

Exams – 70%

(3 midterms and 1 final exam)

Comments/Suggestions:

① Math is not a spectator sport! Work lots of problems! Be prepared to learn from your mistakes!

② Formulating and asking questions is important! There are no bad questions except ones you have but don't ask!

③ Critically monitor your own work. Seek extra assistance when needed!

④ A strong background in Calculus 1 is very important for this course.

What is a function of one variable?

A function $f(x)$ with domain D is a rule that assigns a real number $f(x)$ to each real number in D.

Here D is a set of real numbers.

$D = \text{domain}(f) = \text{Dom}(f)$

example $\quad f(x) = \sqrt{1-x^2}$

$$f(0) = \sqrt{1-0^2} = \sqrt{1} = 1$$

$$f(2) = \sqrt{1-2^2} = \sqrt{-3} = \text{DNE}$$

This means that 2 is not in domain(f).

Domain of consists of all numbers for which the equation makes sense

Here that means that x must satisfy that $1-x^2 \geq 0$.

This happens when x is between -1 and 1.

So $-1 \leq x \leq 1$ or we say that x is in the interval $[-1, 1]$.

and we write

$$\text{Domain}(f) = [-1, 1].$$

Alternate interpretation: Domain(f) consists of all real numbers x where $f(x)$ does not equal DNE.