

8/25/14

- www.math.utoledo.edu/~codenth/
- non-graphing calculators only on exams
- quiz every Monday and Thursday
- note taker needed.
 - <http://get.flashnotes.com/toledo-academic-access/>

Preview:

$$\begin{array}{ccc} f: \mathbb{R} & \longrightarrow & \mathbb{R} \\ x & \longmapsto & f(x) \\ \uparrow & & \uparrow \\ \text{input} & & \text{output} \end{array}$$

① Derivatives and linear approximation:

$$f(a+h) = f(a) + f'(a)h + E(a,h) \quad \text{where} \quad \frac{|E(a,h)|}{|h|} \rightarrow 0 \text{ as } |h| \rightarrow 0$$

Ex: $f(x) = x^3$ $f(5+h) = f(5) + f'(5)h + E(5,h)$

$$f(5+h) = (5+h)^3 = 5^3 + 3 \cdot 5^2 \cdot h + (3 \cdot 5 \cdot h^2 + h^3)$$

$$f(a) = 5^3$$

$$f'(x) = 3x^2 \quad f'(a) = 3 \cdot 5^2$$

$$E(a,h) = 3 \cdot 5 \cdot h^2 + h^3$$

$$\frac{|E(a,h)|}{|h|} = \frac{|3 \cdot 5 \cdot h^2 + h^3|}{|h|} \rightarrow 0$$

② Chain Rule:

⑤ Fundamental Theorem of Calculus.
 $\int_a^b f'(x) dx = f(b) - f(a)$ (Chapter 10)

Multivariable Calculus: ~~Grads~~
 $f: \mathbb{R}^n \rightarrow \mathbb{R}^m$
 domain: \mathbb{R}^n
 codomain: \mathbb{R}^m

Ex 1: $f: \mathbb{R} \rightarrow \mathbb{R}^3$
 $t \mapsto \langle t^2 + 4, \sin(t), e^{6t} \rangle$ Chapter 13
 $f(0) = \langle 4, 0, 1 \rangle$

Ex 2: Chapter 14 & 15

$f: \mathbb{R}^3 \rightarrow \mathbb{R}$
 $\langle x, y, z \rangle \mapsto x^2y - 3(y+2)z^3$
 $f(3, 1, 2) = f(\langle 3, 1, 2 \rangle)$
 $= 9 \cdot 1 - 3(1+2)8$
 $= -63$
 *plug this input into the output equation!

Ex 3:
 $f: \mathbb{R}^3 \rightarrow \mathbb{R}^3$
 $\langle x, y, z \rangle \mapsto \langle xy, z, 2 + xyz \rangle$

$f(2, 3, 5) = \langle 6, 30, 120 \rangle$

look up how to do this