don't need to simply

3 digits after the decimal point

justify

indicate the unit of measures

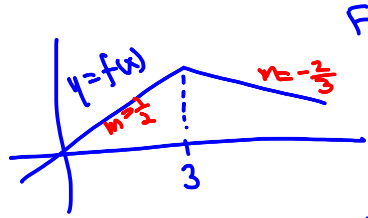
exact value -- $\sqrt{3}$, $\cancel{1.732}$

---

diff

$$\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

Find a pt. function is Not diff. at x=3



$$\lim_{h\to 0^-} \frac{f(x+h)-f(x)}{h} = \frac{1}{2}$$

$\neq$

$$\lim_{h\to 0^+} \frac{f(x+h)-f(x)}{h} = -\frac{2}{3}$$

$$\lim \frac{f(x+h)-f(x)}{h} = \text{DNE}$$

This show that the fn - Not diff

if a function is differentiable then it is continuous.

Int. value Th.

continuity

1) $a(t_1) > 0$

$a(t_2) < 0$

$\therefore a(c) = 0$, $t_1 < c < t_2$ by IVT

2) show that

$a(t) = b(t)$

$a(t_1) - b(t_1) > 0$

$a(t_2) - b(t_2) < 0$

$\therefore a(c) - b(c) = 0$

$a(c) = b(c)$

by IVT.

MVT

continuity and differentiability

For [2,6], is there a time, t, where $v(t) = 0$?

Show that $v(2) > 0$

$v(6) < 0$ & $v(t)$ is cont. over the int.

Then, by Int. val. thm, there is t, $v(t) = 0$, $2 < t < 6$.

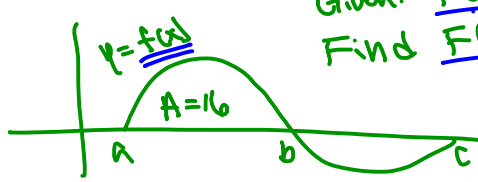
Let $F(x) = \int f(x)\,dx$.

$g(x) = \int h(x)\,dx$

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Given: $F(b) = 2$

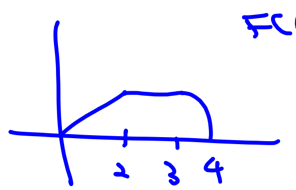
Find $F(a)$



$$\int_a^b f(x)\,dx = F(b) - F(a)$$

$$16 = 2 - F(a)$$

$$F(a) = 2 - 16 = -14$$



$$\int_0^x f(x)\,dx$$

[0,6]
[6,9]
$\underline{n=2}$

x	0	3	6	7.5	9
y	4	5	11	-1	2

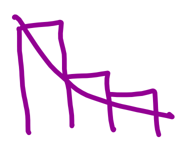
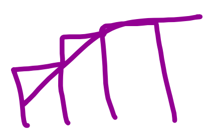
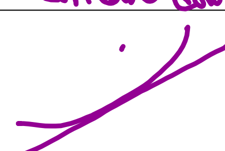
h

LRAM $4(6)+11(3)$

RRAM $11(6)+2(3)$ $\quad \frac{1}{2}(b_1+b_2)h$

MRAM $5(6)+(-1)(3)$

Trap $\frac{1}{2}(4+11)6+\frac{1}{2}(11+2)3$

	under	over
LRAM	 increasing	 decreasing
RRAM	 dec.	 inc.
Trap.	 concave down	concave up 
tangent line	 concave up	 concave down

rates question (#1 or 2)

RAM's

differential equation

- tangent line

- under / over approx

function (derivative, using the chain rule or integral using u-sub)

- related rates

$h(x) = g(x)$

$\frac{dh}{dx} \cdot \frac{dx}{dt} = \frac{dh}{dt}$

$\frac{dg}{dx} \cdot \frac{dx}{dt}$

Given:

$y = g(x)$

$\frac{dx}{dt}$

Find $\frac{dh}{dt}$