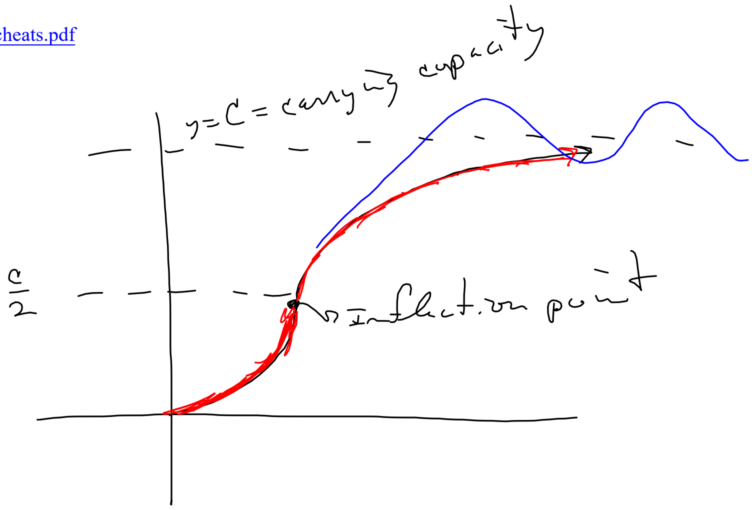
https://harryzaims.com/201/201-fall-17/notes/170914-chapter-2-cheats.pdf

$$P(t) = \frac{C}{1+be^{-kt}}$$



§2.7 #20 $\quad F = G\frac{m_1 m_2}{r^2} = G m_1 m_2 r^{-2}$

a $\Rightarrow \frac{dF}{dr} = -2 G m_1 m_2 r^{-3} = \frac{-2 G m_1 m_2}{r^3}$

b $\left.\frac{dF}{dr}\right|_{r=20,000\text{ Km}} = 2\text{ N/Km}$

$\boxed{\text{want } \left.\frac{dF}{dr}\right|_{10,000\text{ Km}}}$

$$\frac{-2 G m_1 m_2}{(20000)^3} = 2$$

$$-2 G m_1 m_2 = 2(20,000)^3$$

$$\Rightarrow G = \frac{-20,000^3}{m_1 m_2} \qquad \frac{20000^3}{10000^3} = \frac{2^3(10000)^3}{10000^3} = 8$$

$$\frac{-2(-20000)^3 m_1 m_2}{(10,000)^3} = -2(-8) m_1 m_2 = \left.\frac{dF}{dr}\right|_{r=10000}$$

29. Suppose that the cost (in dollars) for a company to produce x pairs of a new line of jeans is

$$C(x) = 2000 + 3x + 0.01x^2 + 0.0002x^3$$

(a) Find the marginal cost function.
(b) Find $C'(100)$ and explain its meaning. What does it predict?
(c) Compare $C'(100)$ with the cost of manufacturing the 101st pair of jeans.

29 Let x = the # of pairs of jeans produced &

$C = C(x)$ = the cost of producing x pairs of jeans

And $C(x) = .0002x^3 + .01x^2 + 3x + 2000$

Marginal Cost is the cost of producing one more unit at given level of production x.

Formally: $\dfrac{C(x+1) - C(x)}{(x+1) - x} = C(x+1) - C(x)$

Practically:

Marginal Cost $= C'(x)$!

$C := x \to .0002 \cdot x^3 + .01 \cdot x^2 + 3 \cdot x + 2000$

$$C := x \mapsto 0.0002\, x^3 + 0.01\, x^2 + 3\, x + 2000$$

$Cp := \mathrm{D}(C)$

$$C'(x) = Cp := x \mapsto 0.0006\, x^2 + 0.02\, x + 3$$

@ 100 units (pairs of jeansC)

$C(101) - C(100)$ = The cost of the 101st pair

11.0702

$Cp(100)$ = Marginal cost @ $x = 100$ pairs produced.

11.0000

§2.7 #21

$A(x) = \frac{p(x)}{x}$, where

A = average production as a function of

x = the # of workers, and

p(x) = production

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

$\Longrightarrow$ a) $A'(x) = \frac{p'(x)\,x - p(x)}{x^2}$

why does the company want to add people if $A'(x) > 0$? Productivity is increasing. They're getting more in productivity by adding people. The benefit of adding workers is greater than the cost of adding them.

b) $A'(x) > 0 \Rightarrow \frac{p'(x)\,x - p(x)}{x^2} > 0$

$\Longrightarrow p'(x)\,x - p(x) > 0$ b/c $x^2 > 0$

$\Longrightarrow p'(x)\,x > p(x)$

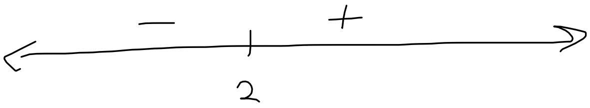
$\Longrightarrow p'(x) > \frac{p(x)}{x}$ (b/c $x > 0$)

So we want $p'(x)$ greater than average production

An aside: $\frac{B(x)}{(x-2)^3} > 0$

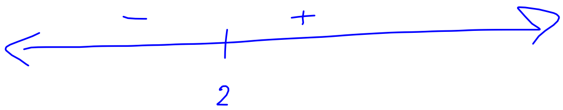
Does not imply $B(x) > 0$

$(x-2)^3$



Suppose $B(x) = x^2+1$

Then $\dfrac{x^2+1}{(x-2)^3} > 0$



$\dfrac{x^2+1}{(x-2)^3}$

So $\dfrac{x^2+1}{(x-2)^3} > 0$ for $\underline{\underline{x > 2}}$

$x^2+1 > 0$ is true but doesn't help.