1

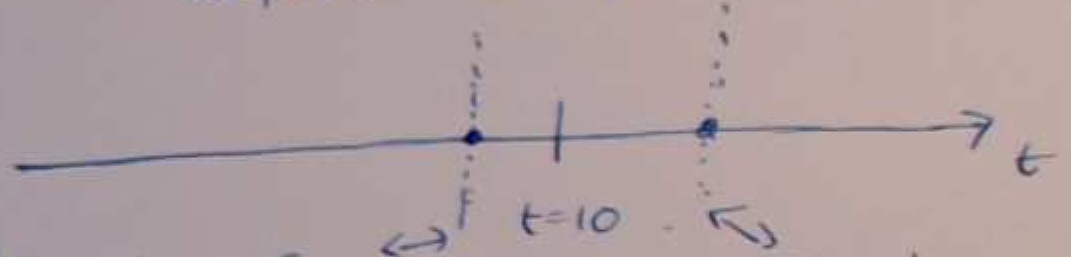
WW 5.5 Q7

$$\frac{d}{dt}\int_{10}^{t} \sec(19x+60)\,dx = \cancel{\sec t}$$

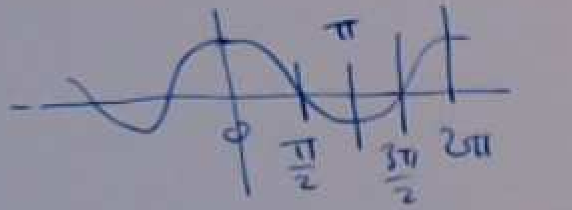
$$= \sec(19t+60).$$

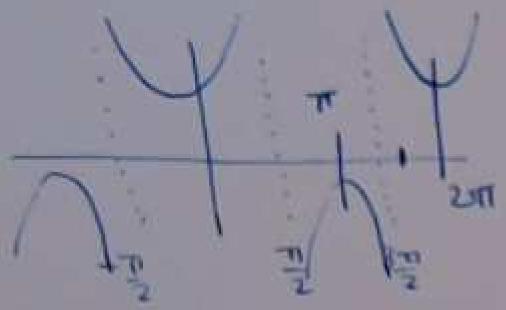
FTC1 $\frac{d}{dt}\int_{0}^{x} f(t)\,dt = f(x).$

defined at $t=10$.



$\sec(x) = \frac{1}{\cos(x)}$.





$39\frac{1}{2}\pi = 38\pi + 1.5\pi$

$\cancel{39}\,40\,\pi + \frac{1}{2}\pi$.

$t=10$: $190+60 = \frac{250}{2\pi} = 39.7\ldots$

$1.7\ldots$

$38\pi + 1.7\pi\ldots$

$19t+60 = 39\frac{1}{2}\pi$.

$t = \frac{39.5\pi - 60}{19}$.

$19t+60 = \cancel{39}\ 40\frac{1}{2}\pi$

$t = \frac{40.5\pi - 60}{19}$.

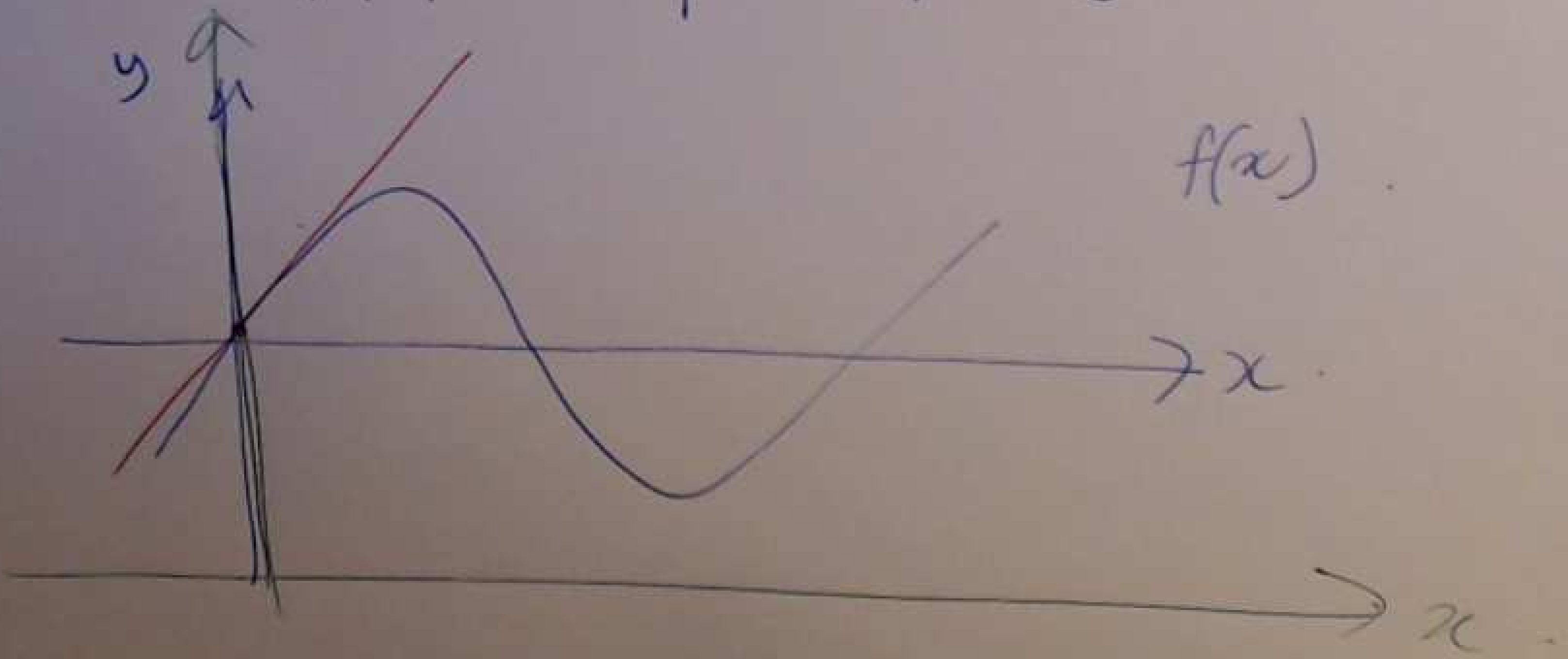
Recording Unpin Video

(2)

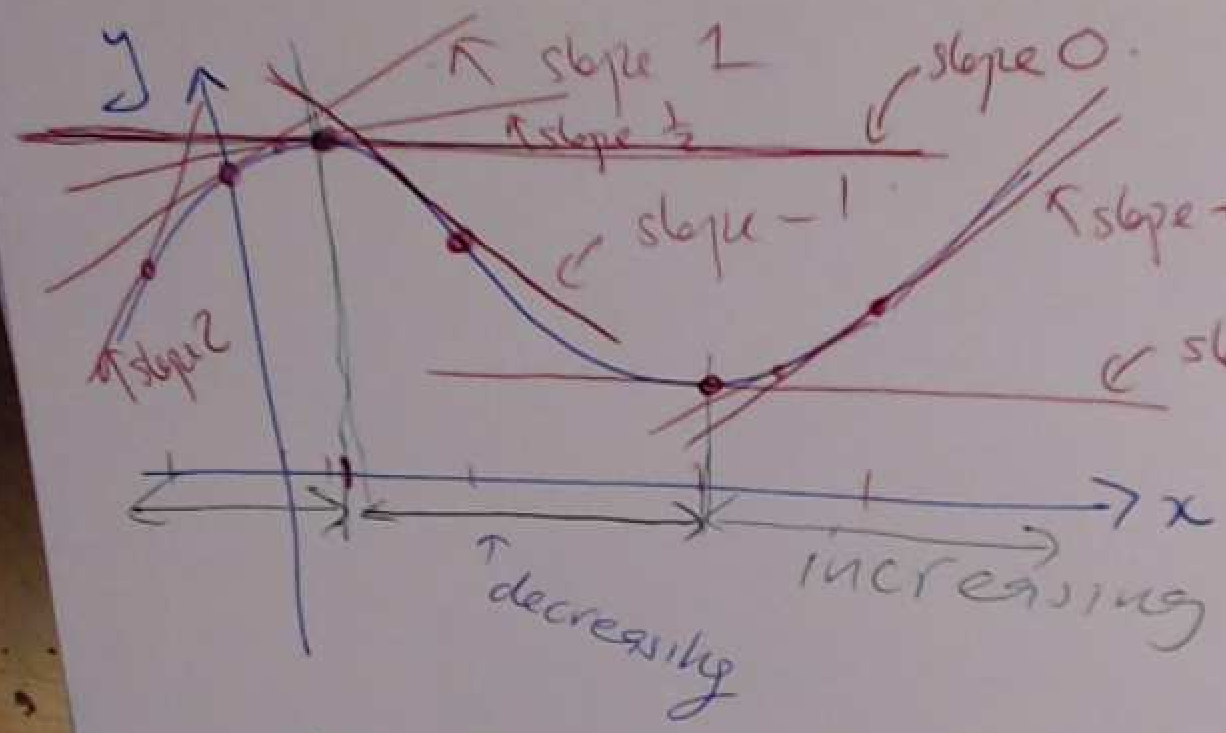
find | draw a picture of a function $f(x)$.

where $f(x)$ is positive / negative

$f'(x)$ is positive / negative.



Joseph Maher



f(x).

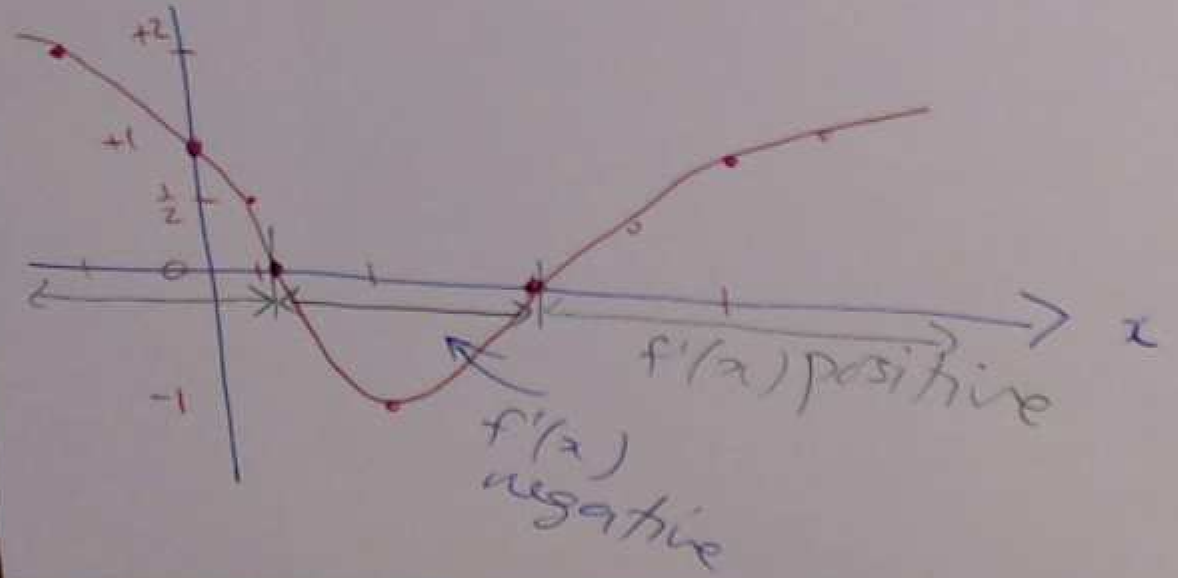
critical point.

$\updownarrow$

$f'(x) = 0$

$\updownarrow$

slope 0
horizontal tangent lines for f(x)



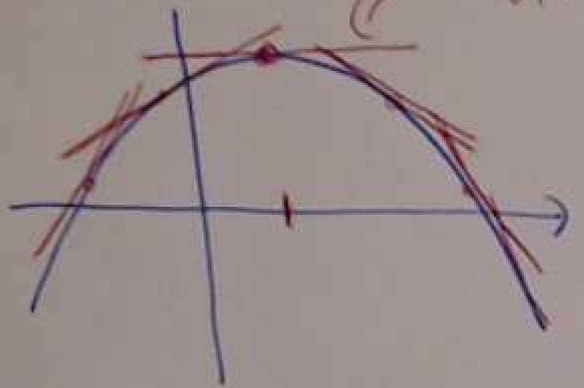
f'(x).

$f''(x) > 0$ concave up $\cup$

$f''(x) < 0$ concave down $\cap$

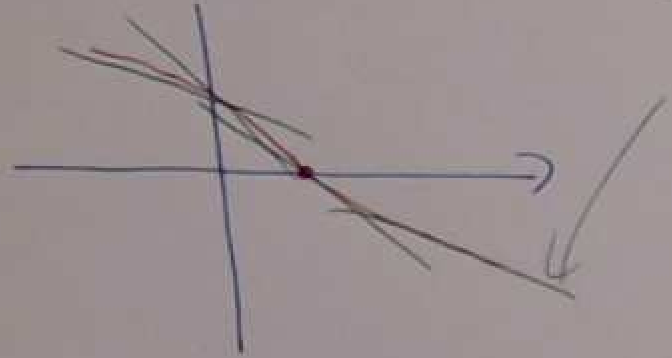
tangent lines to f(x)

1

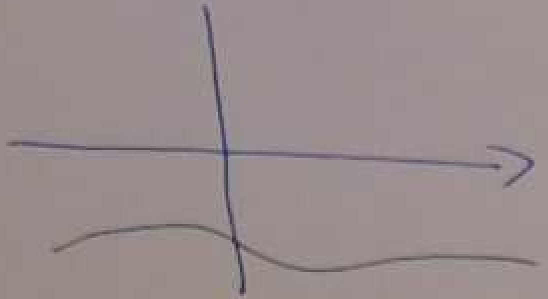


$f(x)$

tangent lines to $f'(x)$



$f'(x)$

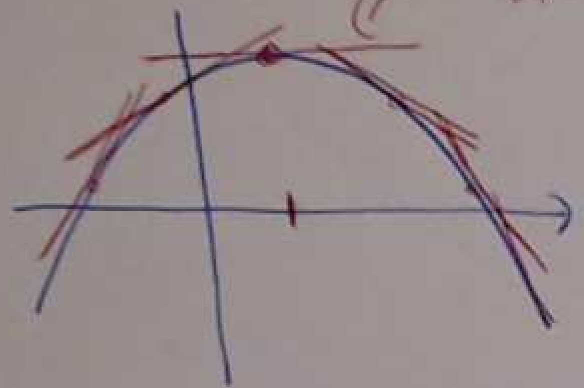


$f''(x)$

$f(x)$	concave down	concave up
	↕	↕
$f'(x)$	decreasing	increasing
	↕	↕
$f''(x)$	negative	positive

④

tangent lines to $f(x)$

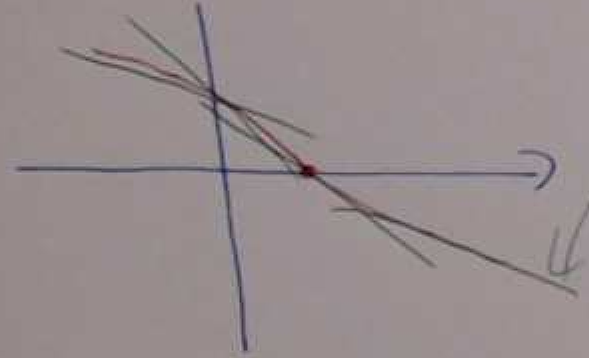


$f(x)$

concave down.

concave up.

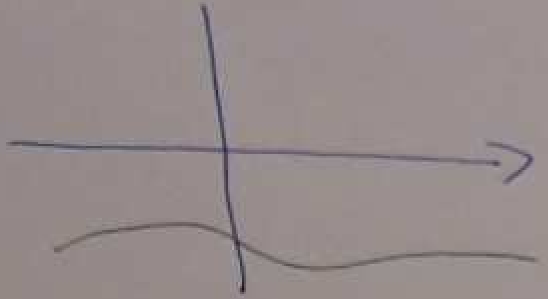
tangent lines to $f'(x)$



$f'(x)$.

decreasing

increasing

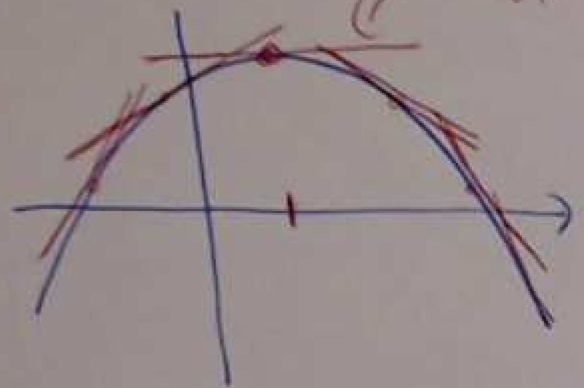


$f''(x)$.

negative

positive

tangent lines to f(x)

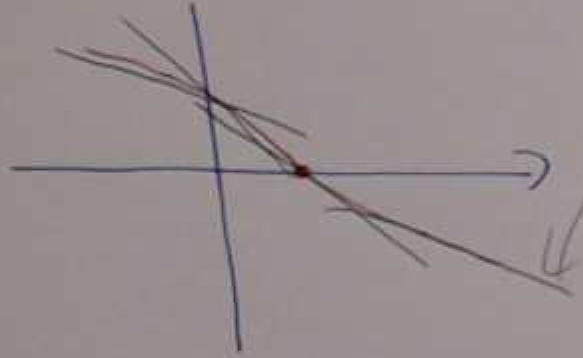


f(x)

concave down

concave up

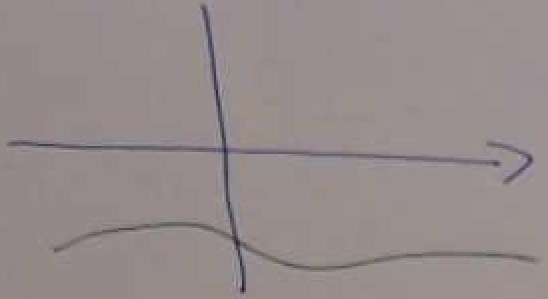
tangent lines to f'(x)



f'(x)

decreasing

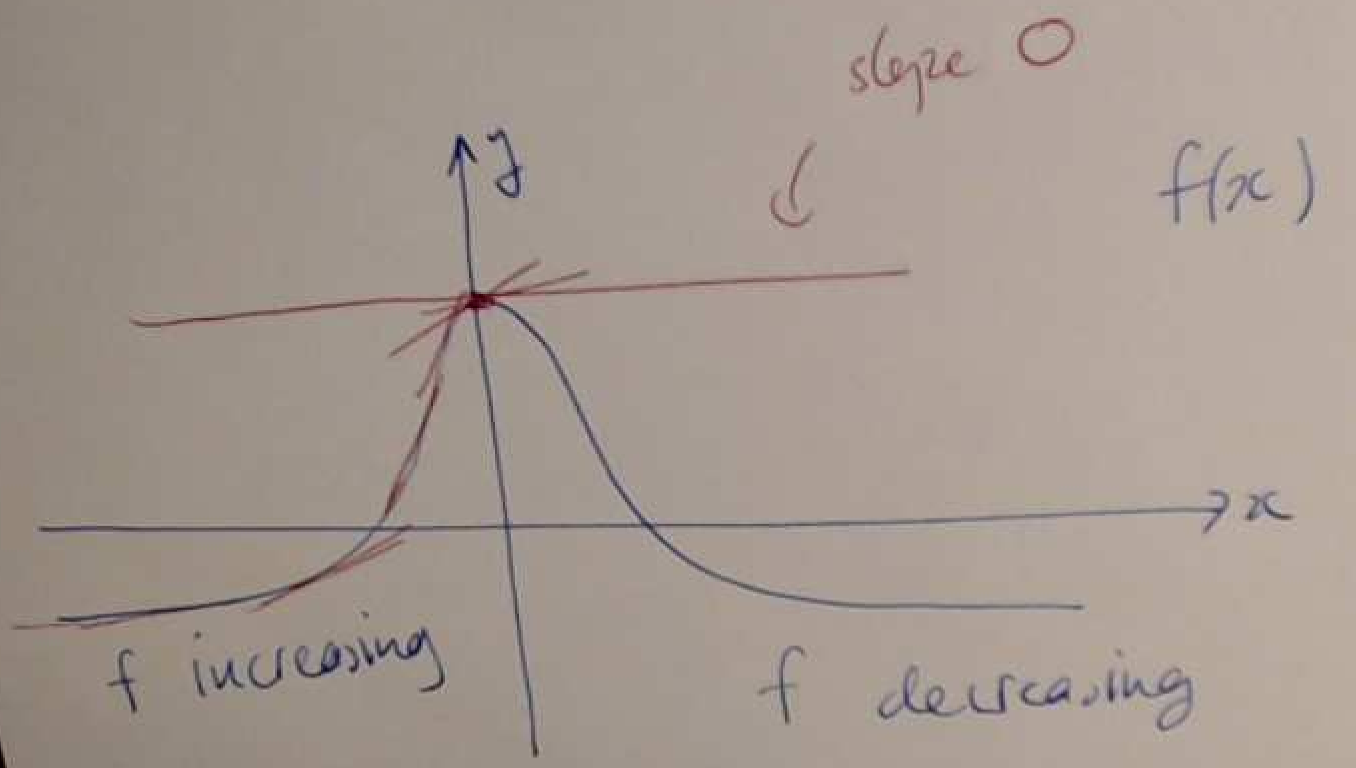
increasing

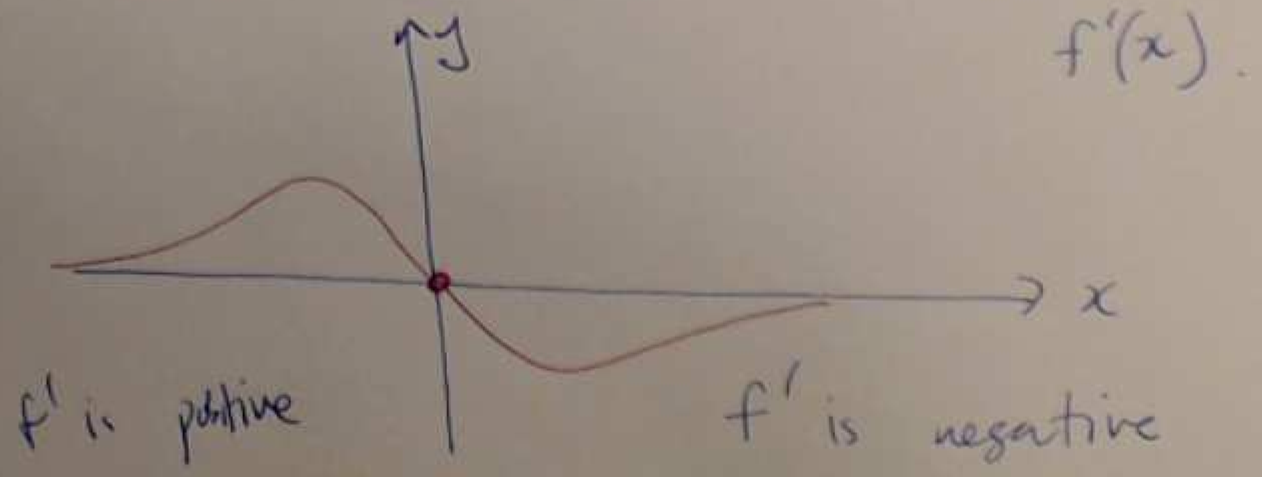


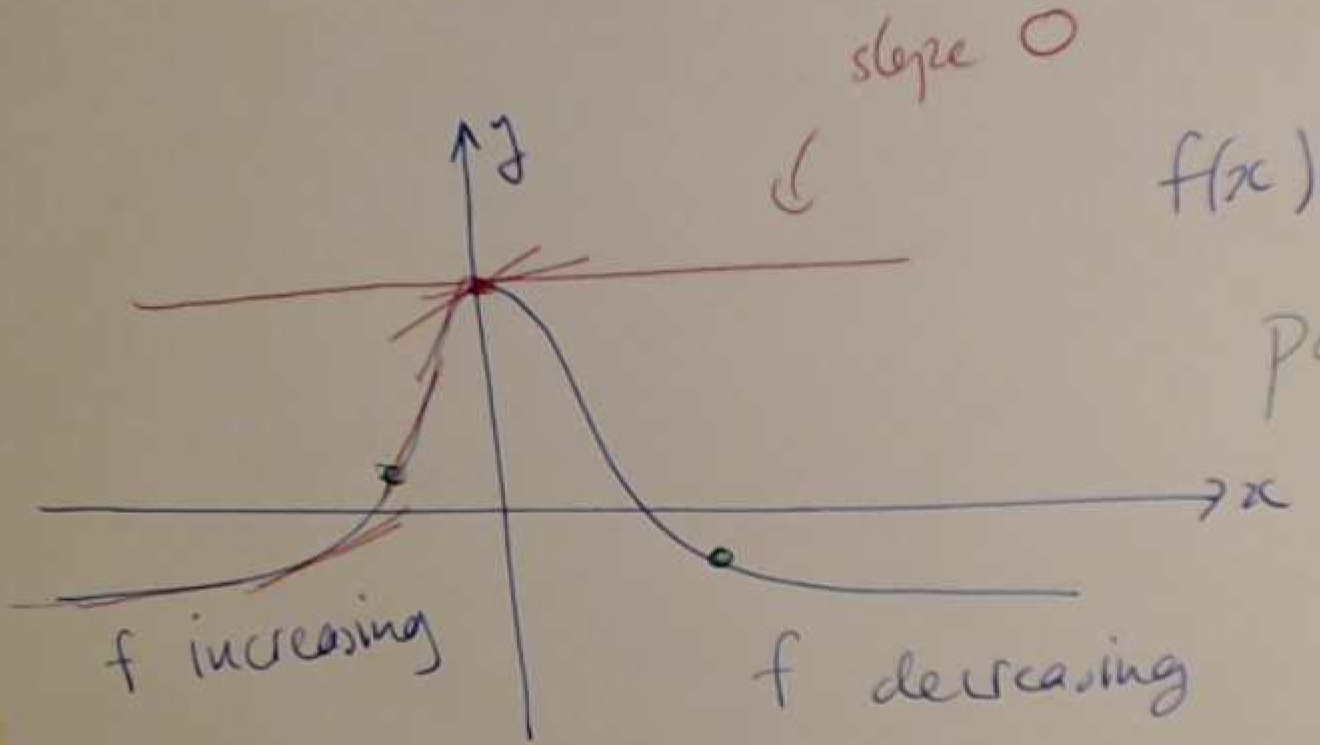
f''(x)

negative

positive


slope 0
y
f(x).
x
f increasing
f decreasing


y
f'(x).
x
f' is positive
f' is negative



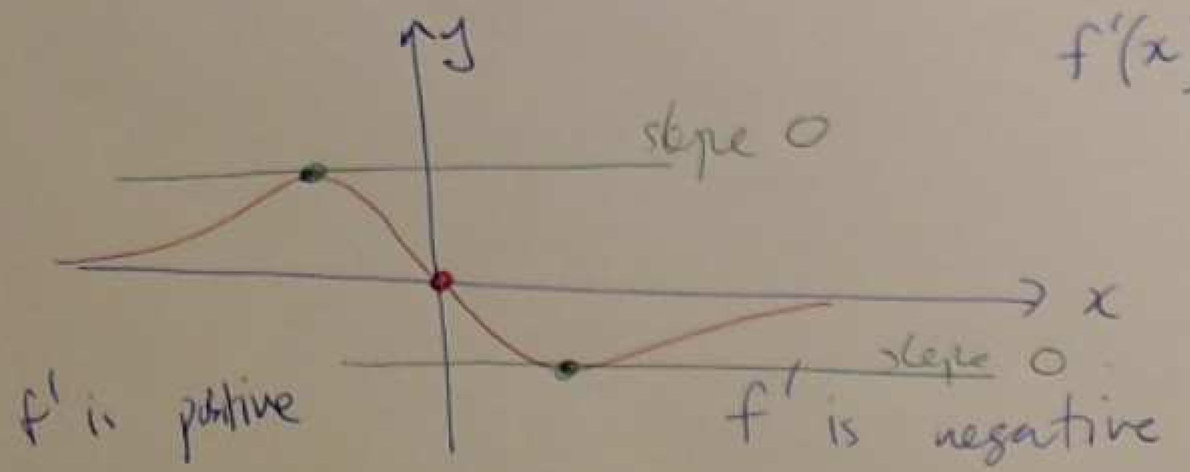
$f(x)$.

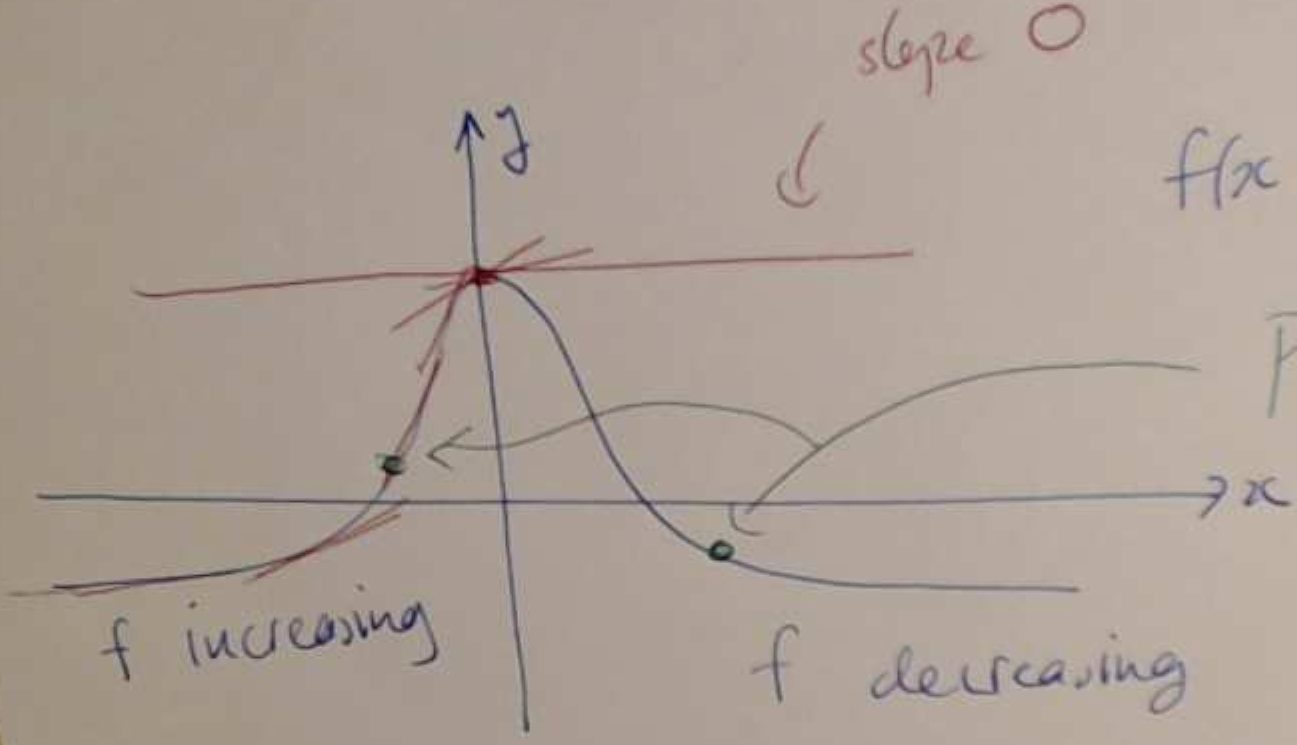
points of inflection

$\Updownarrow$

$f''(x) = 0$

$f'(x)$.



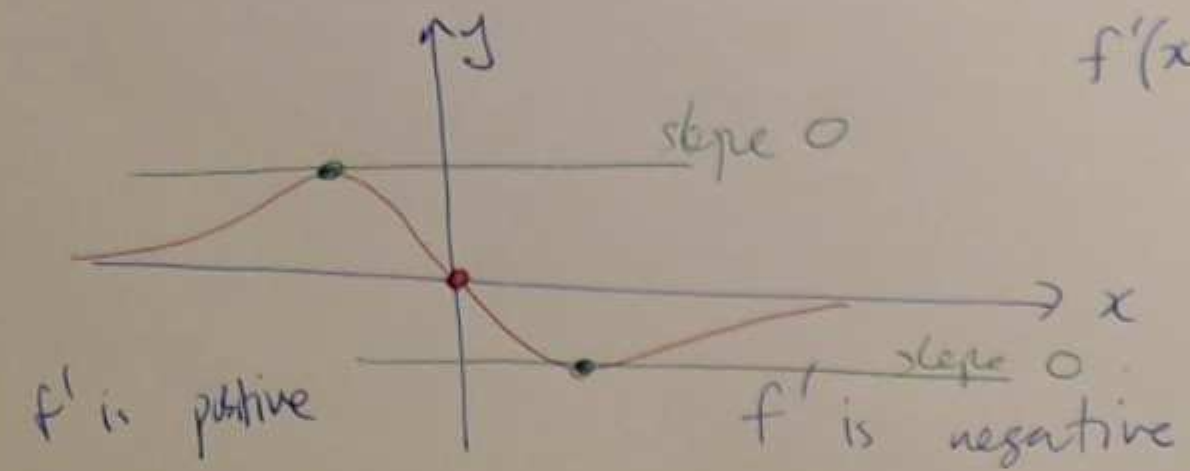


$f(x)$

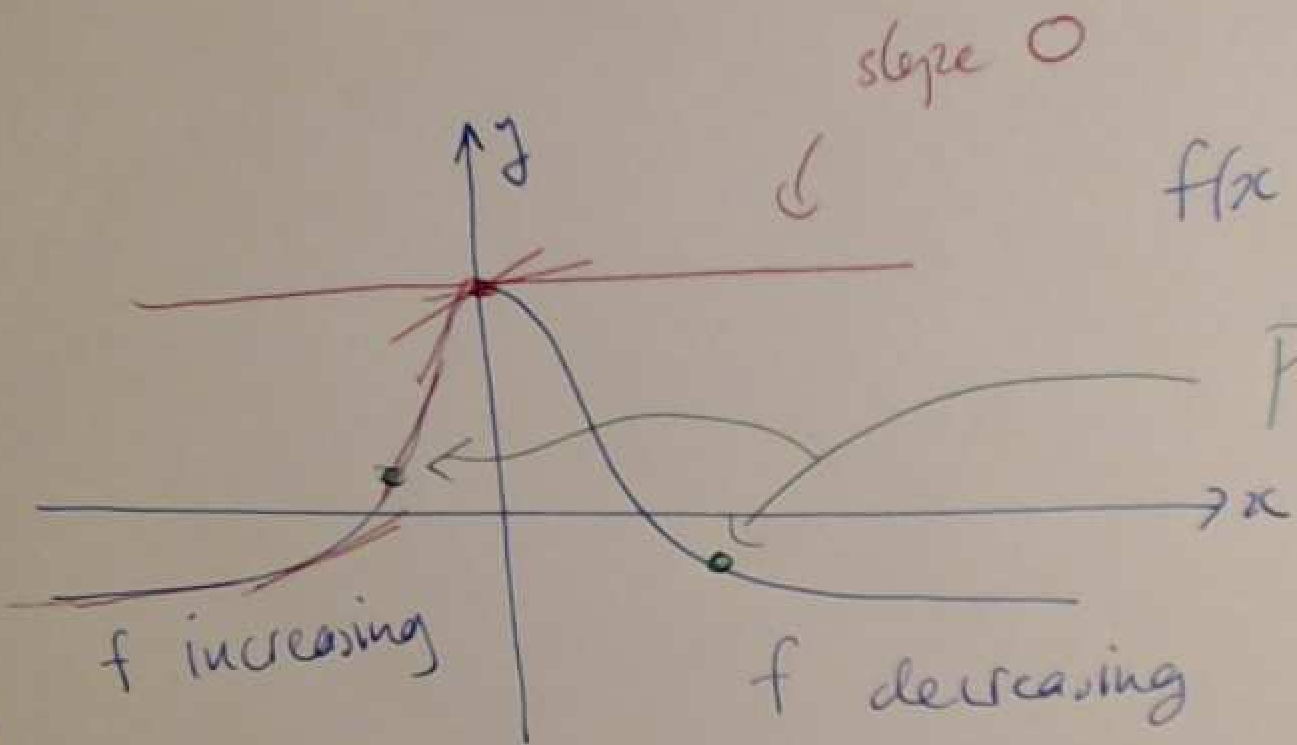
points of inflection

$\Updownarrow$

$f''(x) = 0$



$f'(x)$

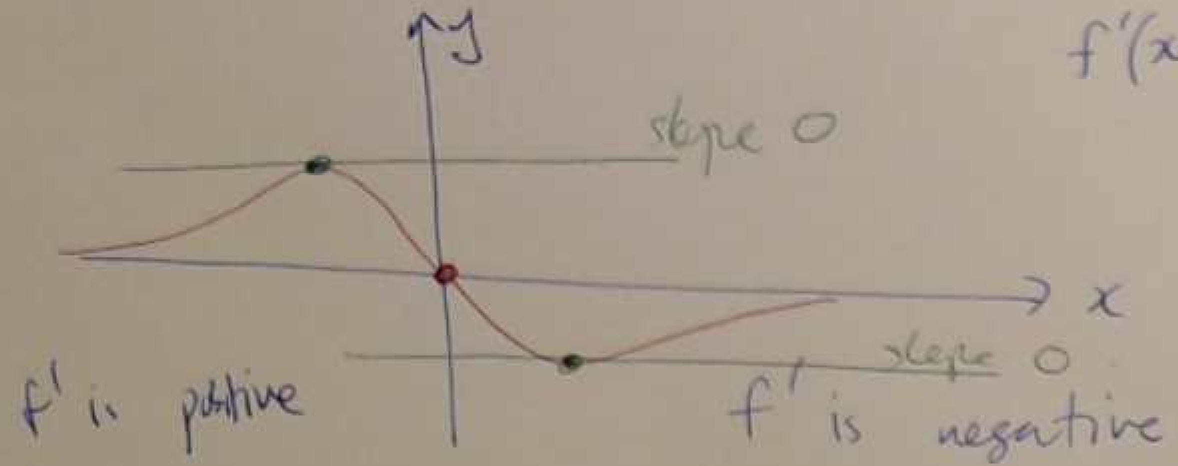


$f(x)$

points of inflection

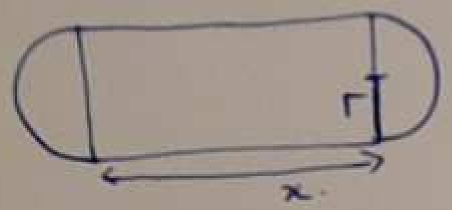
$\Updownarrow$

$f''(x) = 0$



$f'(x)$

Q13



$P = 1200$ m

minimize area.

$P = 2x + 2\pi r = 1200 \rightarrow 2x = 1200 - 2\pi r$

$A = x \cdot 2r + \pi r^2$

$A = (1200 - 2\pi r)r + \pi r^2$

$A = 1200r - 2\pi r^2 + \pi r^2 = 1200r - \pi r^2$.

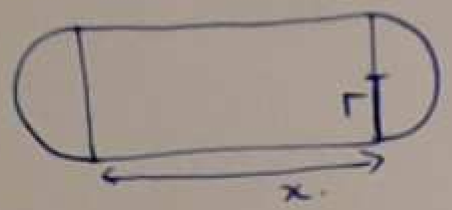
$\frac{dA}{dr} = 1200 - 2\pi r$ critical points $\frac{dA}{dr} = 0$

$1200 - 2\pi r = 0$

$A = \left(1200 - 2\pi \cdot \frac{600}{\pi}\right)\frac{600}{\pi} + \pi\left(\frac{600}{\pi}\right)^2$ $r = \frac{1200}{2\pi} = \frac{600}{\pi}$ m

$= \ldots\ldots$

Q13



$P = 1200$ m

minimize area.

$$P = 2x + 2\pi r = 1200 \rightarrow 2x = 1200 - 2\pi r$$

$$A = x \cdot 2r + \pi r^2$$

$$A = (1200 - 2\pi r) r + \pi r^2$$

$$A = 1200 r - 2\pi r^2 + \pi r^2 = 1200 r - \pi r^2$$

$$\frac{dA}{dr} = 1200 - 2\pi r$$

critical points $\frac{dA}{dr} = 0$

$$1200 - 2\pi r = 0$$

$$r = \frac{1200}{2\pi} = \frac{600}{\pi} \text{ m}$$

$$A = \left(1200 - 2\pi \cdot \frac{600}{\pi}\right)\frac{600}{\pi} + \pi\left(\frac{600}{\pi}\right)^2$$

$$= \ldots\ldots$$