(44) a) Min is 40 at $x=10$

b) Smallest perimeter is 40, happens when $x=10$, so it is a square.

$200x^{-1}$

$$P(x) = 2x + \frac{200}{x}$$

$$P'(x) = 2 - 200x^{-2}$$

$$= 2 - \frac{200}{x^2}$$

$$= \frac{2x^2-200}{x^2}$$

$P' = 0$? $2x^2 - 200 = 0$

$x = \pm 10$

$x = 10$

P' undef? $\cancel{x=0}$

$$P(10) = 2(10) + \frac{200}{10}$$

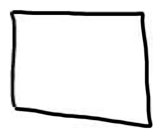
$$= 20 + 20 = 40$$

$\rightarrow$ compare to $P(9)$, $P(11)$

$P(10) = 40$ is a min.

x by $\frac{100}{x}$

10 by $\frac{100}{10} = 10$



(11) $f(x) = \frac{1}{x} + \ln x \qquad 0.5 \le x \le 4$

$$f'(x) = \frac{-1}{x^2} + \frac{1}{x} = \frac{-1+x}{x^2}$$

$f' = 0$? $x = 1$

f' undef? $\cancel{x=0}$

endpts? $x = 0.5$, $x = 4$

Plug in

$f(1) = 1$ min

$f(0.5) = 1.307$

$f(4) = 1.636$ max

(31) $f(x) = (x-2)^{2/3}$

a) $f'(x) = \frac{2}{3}(x-2)^{-1/3} = \frac{2}{3(x-2)^{1/3}}$

$f'(2) = \frac{2}{3(2-2)^{1/3}}$ $\quad f'(2)$ does not exist

b) $f' = 0$? nowhere

endpoints? none

Mean Value Theorem - MVT

If $f(x)$ is continuous on $[a,b]$ and diff. on (a,b) then, there exists a point c on $[a,b]$ at which

1. slope of tan line = slope of secant line
2. $f'(c) = \dfrac{f(b)-f(a)}{b-a}$
3. instantaneous rate of change at c = average rate of change on $[a,b]$

HW: WS - Mean Value Theorem
p194 #18, 37, 40, 43, 52