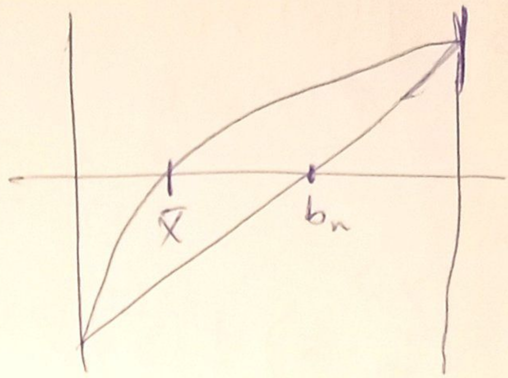
Case 1!

$> <$

$+ \quad -$

$f''(x) < 0$

$f'(x) > 0$



If b_n is fixed, $l = b_n - \bar{x}$

$b_n - \bar{x} > 0$ and $f''(\bar{x}) < 0$

$(b_n - \bar{x}) f''(\bar{x}) < 0$

Since $f'(\bar{x})$ is also greater than zero, it follows that

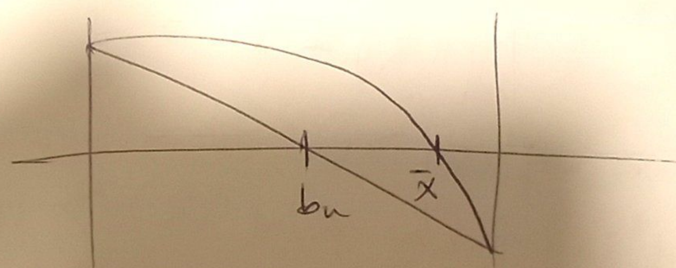
$$\underbrace{2f'(\bar{x})}_{>0} + \underbrace{(b_n - \bar{x}) f''(\bar{x})}_{<0} > (b_n - \bar{x}) f''(\bar{x}) \text{ and}$$

$$0 < \frac{(b_n - \bar{x}) f''(\bar{x})}{2f'(p) + (b_n - \bar{x}) f''(\bar{x})} = \lambda < 1$$

Case 2

$f''(\bar{x}) < 0$

$f'(\bar{x}) < 0$



If b_n is fixed, $l = b_n - \bar{x}$

$b_n - \bar{x} < 0$ and $f''(\bar{x}) < 0$

$(b_n - \bar{x}) f''(\bar{x}) > 0$

Since $f'(\bar{x})$ is also less than zero, it follows that

$$2f'(\bar{x}) + (b_n - \bar{x}) f''(\bar{x}) > (b_n - \bar{x}) f''(x)$$

$$0 < \frac{(b_n - \bar{x}) f''(\bar{x})}{2f'(p) + (b_n - \bar{x}) f''(\bar{x})} = \lambda < 1$$