

# Quiz Review $\ln x$ , $\log_a x$ , $e^x$ , $a^x$

①  $2x^2 + 3 \ln y = 8$  @  $(1, 3)$

$$4x + 3 \cdot \frac{1}{y} \frac{dy}{dx} = 0$$

$$4(1) + 3 \cdot \frac{1}{3} \frac{dy}{dx} = 0$$

$$= \frac{dy}{dx}$$

$$\frac{dy}{dx} = -4$$

③  $f(x) = \ln(\sin 2x)$

$$f'(x) = \frac{1}{\sin 2x} \cdot \cos(2x) \cdot 2$$

$$f'(x) = \frac{2 \cos(2x)}{\sin 2x}$$

$$= 2 \cot(2x)$$

②  $f(x) = \ln(\ln(3-x))$

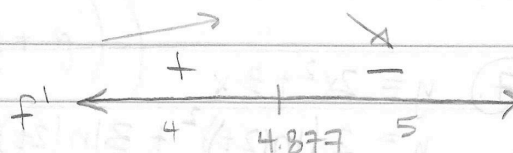
$$f'(x) = \frac{1}{\ln(3-x)} \cdot \frac{1}{3-x} \cdot -1$$

$$= \frac{-1}{(3-x) \ln(3-x)}$$

④  $f'(x) = 3 \ln x - 2x + 5$

$$0 = 3 \ln x - 2x + 5$$

$$4.877 = x$$



⑤  $y = (5x)^{5x}$

$$\ln y = 5x \ln 5x$$

$$\frac{1}{y} \frac{dy}{dx} = 5x \cdot \frac{1}{5x} \cdot 5 + \ln 5x (5)$$

$$\frac{1}{y} \frac{dy}{dx} = 5 + 5 \ln 5x$$

$$\frac{dy}{dx} = 5x^{5x} (5 + 5 \ln 5x)$$

$f$  has a max @

$$x = 4.877 \text{ b/c}$$

$f'(x)$  changes from + to -