

$(52)$   $y = xe^{-x}$   $[0, 2)$

$y(0) = 0$   $y(2) = 2e^{-2} = \frac{2}{e^2} = 0.270$   
 $\text{MIN}$

$\frac{dy}{dx} = e^{-x} - xe^{-x} = 0 \Rightarrow e^{-x}(1-x) = 0$   
 $x=1$  is critical pt.

$y(1) = 1e^{-1} = \frac{1}{e} = 0.36$   
 $\text{MAX}$

(53)  $y = \frac{\ln x}{x}$   $[1, 3]$

$y(1) = \frac{\ln 1}{1} = 0$   
*min*

$y(3) = \frac{\ln 3}{3} = 0.366$

$\frac{dy}{dx} = \frac{x \cdot \frac{1}{x} - \ln x}{x^2} = \frac{1 - \ln x}{x^2} = 0$

$x = e$  is critical pt.

$y(e) = \frac{\ln e}{e} = \frac{1}{e} = 0.367$   
*MAX*

$$\frac{w(60) - w(5)}{60 - 5} = \text{avg. rate of change}$$

$$\frac{w(60) - w(5)}{60 - 5} = w'(c)$$

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$$\textcircled{c} \quad \frac{dw}{dt} = \frac{dw}{dv} \cdot \frac{dv}{dt}$$