Day 3 :

§6.2:32 $k(r) = e^r + r^e$

$k'(r) = e^r + er^{e-1}$.

§6.2:87: $\int e^{\tan(x)} \sec(x)^2 dx$

$u = \tan(x)$

$\frac{du}{dx} = \sec(x)^2 \Rightarrow du = \sec(x)^2 dx$

$$\int e^{\tan(x)} \sec(x)^2 dx = \int e^u du$$

$$= e^u + C$$

$$= e^{\tan(x)} + C.$$

Day 4

§6.3: 50

$$\lim_{x \to 0^+} \ln(\sin(x))$$

$$= \ln\left(\lim_{x \to 0^+} \sin(x)\right)$$

$$= \ln(0) = -\infty \quad \text{or} \quad \text{DNE}.$$

Day 5: §6.4: 62

$x > 0$

$f(x) = x\ln(x)$ find the ~~intervals~~ absolute minima & justify your answer.

soln $f'(x) = x \cdot \frac{1}{x} + \ln(x)$

$= 1 + \ln(x)$

$f''(x) = 0 + \frac{1}{x}.$

Critical pts: $f'(x) = 0,$

$1 + \ln(x) = 0$

$\Rightarrow \ln(x) = -1$

$x = e^{-1}.$

test concavity at the critical point

$f''(e^{-1}) = \frac{1}{e^{-1}} = e > 0 \Rightarrow$ concave up at $x = e^{-1}.$

This shows that it is a relative minima.

Since $f'(x) > 0$ for $x > e^{-1}$ and it is an absolute extrema on the interval $[0, e^{-1}]$ it is an absolute extrema on $[0, \infty)$.