

You must show your work to get full credit.

1. Let a be a constant. Find the derivatives of the following:

(a) $y = x^2(x - a)$ $y' = \underline{x(3x - 2a)}$

$$\begin{aligned} y' &= (x^2)'(x - a) + x^2(x - a)' \\ &= 2x(x - a) + x^2 \\ &= 2x^2 - 2ax + x^2 = 3x^2 - 2ax \\ &= x(3x - 2a) \end{aligned}$$

(b) $f(t) = xe^{-ax}$ $f'(t) = \underline{(a - x)e^{-ax}}$

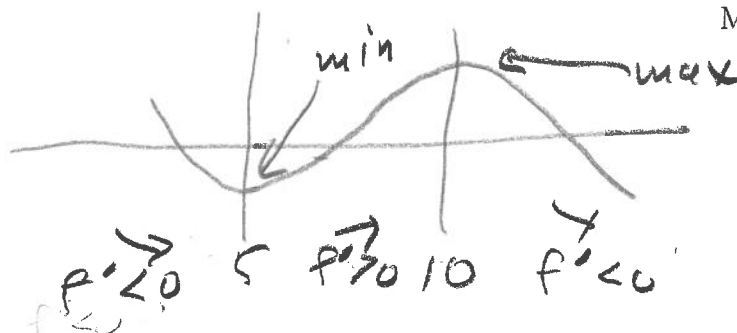
$$\begin{aligned} f'(x) &= (x)'e^{-ax} + x(e^{-ax})' \\ &= 1e^{-ax} - axe^{-ax} \\ &= e^{-ax}(a - x) \end{aligned}$$

2. Let f be a function with

- $f'(x) < 0$ for $x < 5$ and $x > 10$.
- $f'(x) > 0$ for $5 < x < 10$.

Where are the local maximizers and minimizers of f ? Maximizer(s) 5

Minimizers(s) 10



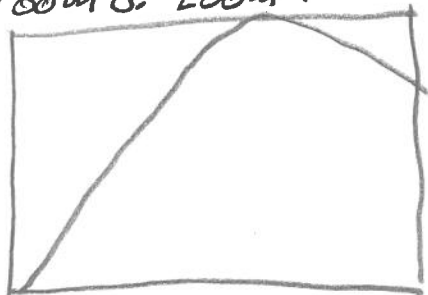
3. Use your calculator to find the maximum and maximizer of $f(x) = \frac{10x}{1+x^2}$ on the interval $0 \leq x \leq 2$.

$$f(x) = 10x / (1 + x^2)$$

$$x_{\min} = 0$$

$$x_{\max} = 2$$

Zoom 0: Zoom F1+



Maximum 5

Maximizer 1

2nd calc 4: maximum

Put in left bound Enter
Put in right bound Enter
Put in Guess Enter