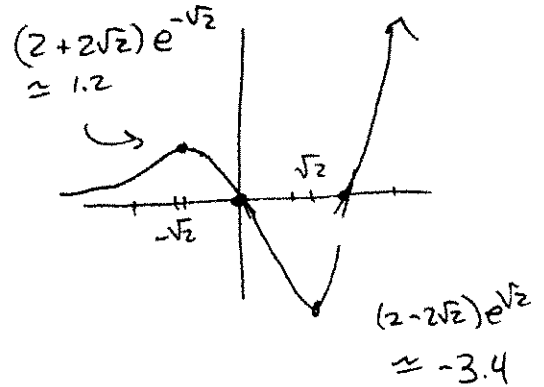


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Let  $f(x) = (x^2 - 2x)e^x$ .

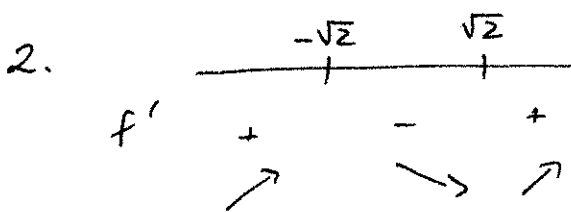
1. Find the critical points of  $f$ .
2. Where is  $f$  decreasing, and where increasing?
3. What are the local maxima and minima of  $f$ ?
4. What are the global maxima and minima of  $f$ ?



$$f'(x) = (2x - 2)e^x + (x^2 - 2x)e^x$$

$$= (x^2 - 2x + 2x - 2)e^x = (x^2 - 2)e^x$$

1. C.P. :  $f' = 0$  when  $x = \pm\sqrt{2}$



Increasing:  $(-\infty, -\sqrt{2})$  and  $(\sqrt{2}, \infty)$

Decreasing:  $(-\sqrt{2}, \sqrt{2})$

3. Local max  $f(-\sqrt{2}) = (2 + 2\sqrt{2})e^{-\sqrt{2}}$   
 Local min  $f(\sqrt{2}) = (2 - 2\sqrt{2})e^{\sqrt{2}}$

4.  $\lim_{x \rightarrow \infty} f(x) = \infty$  so No global max

$\lim_{x \rightarrow -\infty} f(x) = 0$  so global min = local min  
 $= f(\sqrt{2}) = (2 - 2\sqrt{2})e^{\sqrt{2}}$