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1. (5 pts) Find the absolute maximum and minimum values of the following function on the interval  $[-1, 1]$ .

$$f(x) = e^x(x^2 + 1)$$

$$f'(x) = e^x(x^2 + 1) + e^x(2x) = e^x(x^2 + 2x + 1) = e^x(x+1)^2$$

Critical points :  $x = -1$ 

$$f(-1) = e^{-1}((-1)^2 + 1) = \frac{2}{e}$$

$$f(1) = e(1^2 + 1) = 2e$$

Absolute maximum :  $2e$ Absolute minimum :  $\frac{2}{e}$ 

2. (5 pts) Find the value of  $c$  implied by the Mean Value Theorem of  $f(x) = \frac{\sin(x)}{2}$  on the interval  $[0, \pi]$ .

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

$$\frac{f(\pi) - f(0)}{(\pi - 0)} = \frac{0 - 0}{\pi} = 0$$

$$\frac{1}{2} \cos(x) = 0 \Rightarrow x = \frac{\pi}{2}, \frac{3\pi}{2}, \dots$$

Since the value  $c$  implied by MVT is in  $[0, \pi]$

$$c = \frac{\pi}{2}$$