

YOUR NAME:_____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. This problem will guide you through the steps needed to plot by hand the graph of the function $f(x) = x^2e^{-x}$. Please, follow instructions precisely and show your full work.

(a) Find the domain $\text{Dom}(f)$.

(b) Find the x - and the y - intercepts of $y = f(x)$.

(c) Compute

$$\lim_{x \rightarrow -\infty} f(x) =$$

$$\lim_{x \rightarrow +\infty} f(x) =$$

(d) Compute $f'(x)$ and find the critical points.

(e) Compute $f''(x)$ and find the critical points.

- (f) Using the previous two parts make a sign table for f' and f'' and draw conclusions about the monotonicity and the concavity of f together with its local extrema and its inflection points. Show all pertinent information in the last line of your table (referring to f).

- (g) Use your table and all previously gathered information to roughly plot the graph of $y = f(x)$. You **MUST** label your axes at the points of interest.