

**Math 163A Class Drill 8: Using the Graphing Strategy to Graph  $f(x) = xe^{(-x)}$**

Step 1. Analyze  $f(x)$ .

- Find the domain of  $f$ .
- Find the  $y$ -intercept.
- Find the partition numbers for  $f(x)$ .
- Make a sign chart for  $f$  and use it to determine where  $f$  is positive, negative, or zero.
- Find all asymptotes.

Step 2. Analyze  $f'(x)$ .

- Find  $f'(x)$ .
- Find the partition numbers for  $f'(x)$ .
- Construct a sign chart for  $f'(x)$  and use it to determine the intervals on which  $f$  is increasing and decreasing, and to find the  $x$ -coordinates of all local maxima and minima.
- Find the  $y$ -coordinates of all local maxima and minima.

Step 3. Analyze  $f''(x)$ .

- Find  $f''(x)$ .
- Find the partition numbers for  $f''(x)$ .
- Construct a sign chart for  $f''(x)$  and use it to determine the intervals on which  $f$  is concave up and concave down, and to find the  $x$ -coordinates of all inflection points.
- Find the  $y$ -coordinates of all inflection points.

Step 4: Sketch the graph of  $f$ .

- Draw asymptotes and label them with their equations.
- Plot the axis intercepts, local maxima and minima, and inflection points, and label them with their  $(x,y)$  coordinates.
- Using the information about the other information from steps 1, 2, and 3, draw the curve.