Name:_____

MATH 320: QUIZ 4

(1) (3 points) Let $f(x) = x^2 e^{-x}$.
   (a) Compute the first and second derivatives $f'(x)$ and $f''(x)$

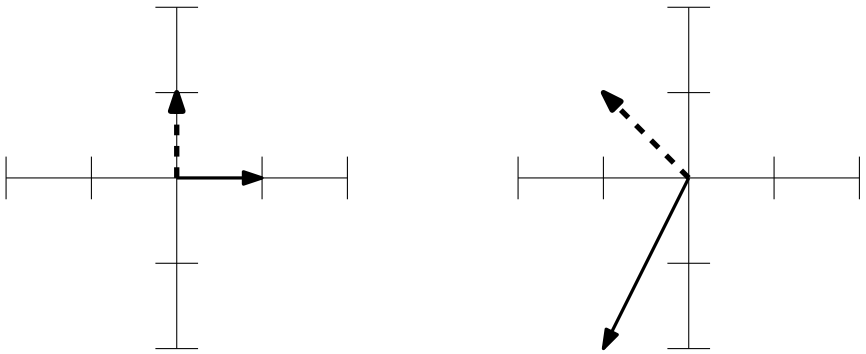
   (b) Based on this computation, list the local optima of $f(x)$ and whether each point is a maximum or minimum.

   (c) Are these points global optima?

(2) Let $g(x) = x^3 - x^2 - 3x - 1$.
   (a) We would like to minimize the value of $g(x)$ between 0 and 2. Suppose our initial root estimate is $x = 1$. What is the equation (in the form $y = ax^2 + bx + c$) for the parabola P that intersects the graph of $g(x)$ at each of these x-values.

(b) Where does P attain its minimum?

(3) Suppose A is a matrix describing a map from $\mathbb{R}^2$ to $\mathbb{R}^2$ sending the solid vector $(1, 0)$ and the dashed vector $(0, 1)$ to the corresponding vectors in the picture at right.



(a) Please write A as a 2×2 matrix.

(b) Evaluate the determinant of A.