Instructions: The purpose of this assignment is to develop your ability to formulate and communicate mathematical arguments. Your complete assignment should have your name and section number on each page, be stapled, and be neat and legible. *Unreadable work will receive no credit.*

You should provide well-written, complete answers to each of the questions. We will look for correct mathematical arguments, complete explanations, and correct use of English. Your solution should be formulated in complete sentences. As appropriate, you may want to include diagrams or equations written out on a separate line. You may read your textbook to find examples of how we communicate mathematics.

Students are encouraged to use word-processing software to produce high quality solutions. However, you may find that it is simpler to add graphs and equations using pen or pencil.

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1. Let $f(x) = e^x(x^2 - 3)$. Find the equation of the tangent line to $f(x)$ at the point $(0, -3)$.

2. (a) Find all points on $y^2 + xy + x^2 = 1$ with $x = 1$.

   (b) Find dy/dx for $y^2 + xy + x^2 = 1$.

   (c) Find the slope of the tangent line to $y^2 + xy + x^2 = 1$ at each point with $x = 1$.

   (d) Find the equations of the normal lines to $y^2 + xy + x^2 = 1$ at the same points. (The normal line is perpendicular to the tangent line at that point.)

   (e) At what point do the two normal lines intersect?