**HOMEWORK 11**
**APPLIED CALCULUS**
**DUE 2013-10-03**

**Show your work!**

(1) (a) In your own words, explain why, when $y'$ is positive and $y''$ is negative, it means that $y$ is increasing slower. Draw a picture of such a function $y$.
   (b) In your own words, explain why, when $y'$ is negative and $y''$ is negative, it means that $y$ is decreasing faster. Draw a picture of such a function $y$.

(2) Consider the function $f(x) = xe^x$.
   (a) Compute the first derivative $f'(x)$, and make a sign diagram for it.
   (b) Compute the second derivative $f''(x)$, and make a sign diagram for it.
   (c) Use your sign diagrams from (a) and (b), and the fact that the only $x$-intercept of $y = f(x)$ is at $x = 0$, to sketch a picture of the graph of $y = f(x)$.

(3) Consider the function $g(x) = e^{-x^2}$.
   (a) Compute the first derivative $g'(x)$, and make a sign diagram for it.
   (b) Compute the second derivative $g''(x)$, and make a sign diagram for it.
   (c) Use your sign diagrams from (a) and (b), and the fact that $g(x)$ is always positive, to sketch a picture of the graph of $y = g(x)$.

- **Seven** book problems: #12.2.20, 27, 31, 33, 51, 52, 61.