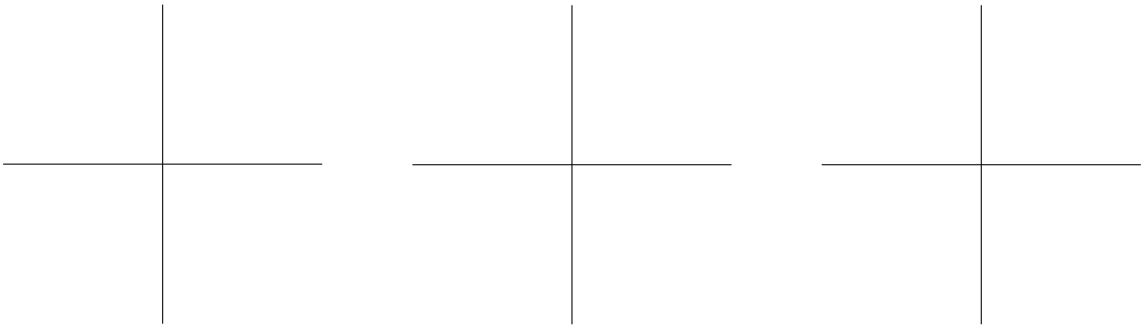
**Daily Homework # 1**

Due Wednesday, January 6th

1. Let $f(x) = x^3 - x$. Calculate $f'$ and $f''$. Graph $f$, $f'$ and $f''$. Remember to label your axes.

$f$ $f'$ $f''$



Using your graph or calculations, answer the following questions. Use interval notation. *Note: A number $x \in \mathbf{R}$ is positive if $x > 0$. A number $x \in \mathbf{R}$ is negative if $x < 0$.*

a) Where is $f$ positive?

b) Where is $f$ increasing?

c) Where is $f'$ positive?

d) Where is $f'$ increasing?

e) Where is $f''$ positive?

*Idea to ponder*: How are the questions above related?
(write some ideas that you have, this question will not be graded).

2. Draw a continuous function defined on the interval $[0, 10]$ that is:

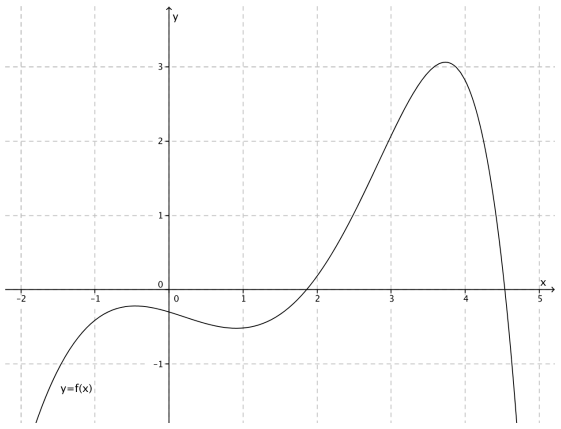
   I ) increasing on the interval $(0, 2)$

   II ) decreasing on the interval $(2, 5)$

   III ) increasing on the interval $(5, 10)$.

   Question: Where are the local maxima and minima of your function? (Give the $x$ coordinates.)

3. For the function below, answer the following questions.




   a) Where is $f$ increasing?

   b) Where is $f$ decreasing?

   c) Where are the local minima?

   d) Where are the local maxima?