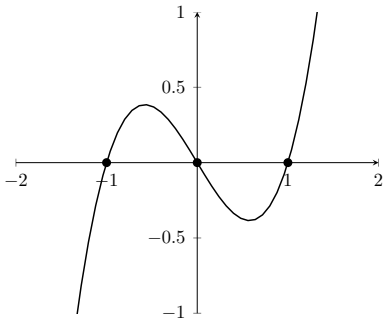
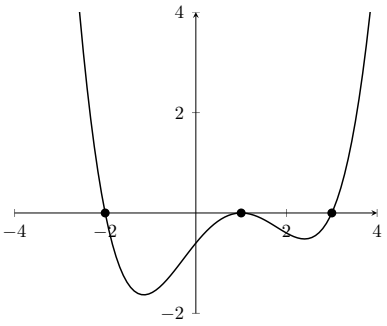
Math Ma **Derivative and Graphs** Fall 2016

1. For the following graphs, first sketch the graph of its derivative and then sketch the graph of its anti-derivative (namely, a function whose derivative is the given function.)

(a)



(b)



2. Let $f(x) = x^3 - x$.

   (a) Sketch the graph of $f(x)$. What is your strategy?

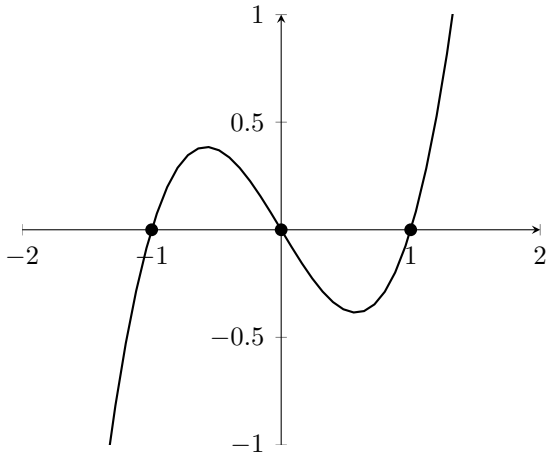
   (b) Use the definition of derivative to find $f'(x)$ and $f''(x)$.

   (c) Is f an odd function, even function, or neither? How about f'?

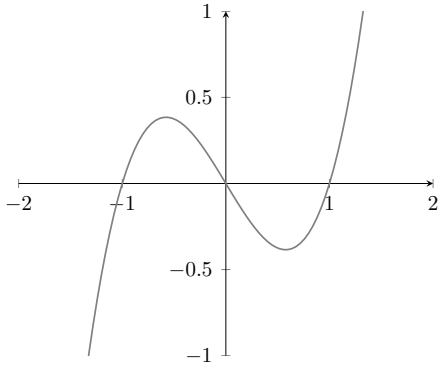
Chi-Yun's strategy to sketch the graph:

Review for graph transformation

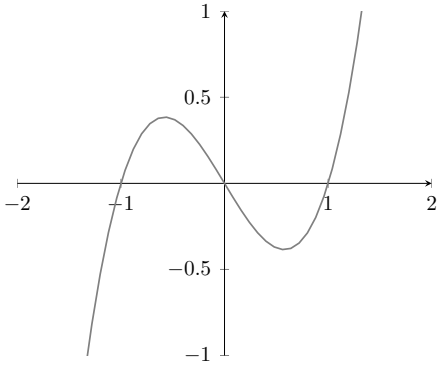
3. Below is the graph of the function $f(x)$. Sketch the graph of the following functions. If you have more time, try to write down their derivative functions, too!



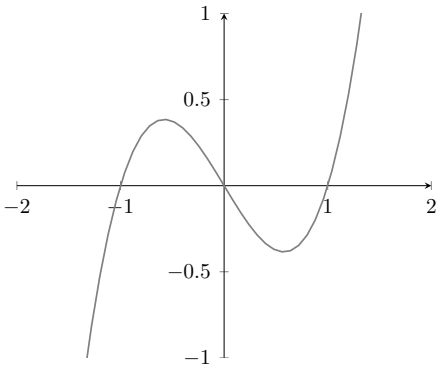
(a) $2f(x+1)$



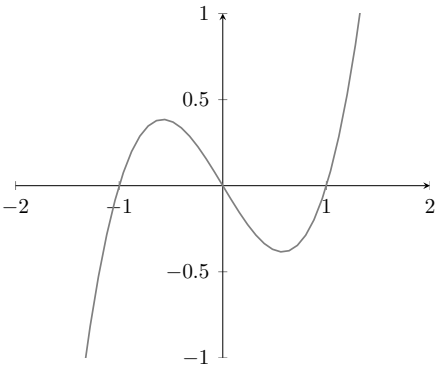
(b) $-f(x-1)+2$



(c) $f(|x|)$



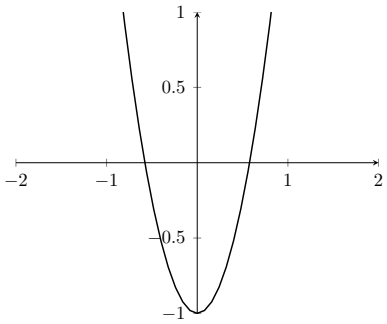
(d) $|f(x)-1|-1$



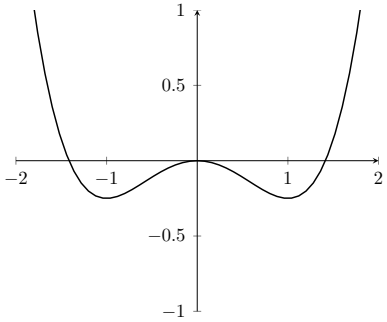
Derivative and Graphs – Solutions

1. (a)

The graph of the derivative

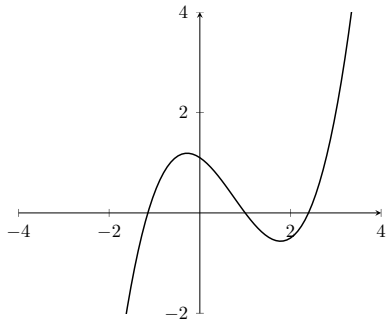


The graph of the anti-derivative

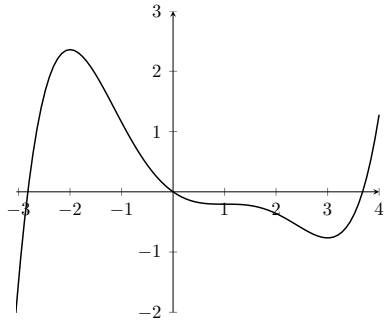


(b)

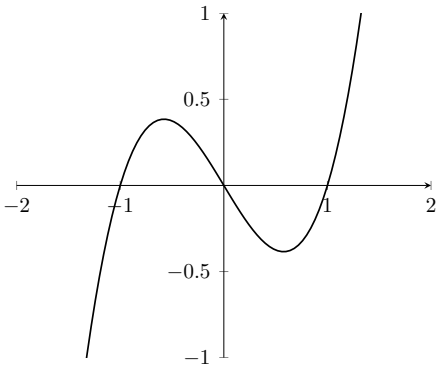
The graph of the derivative



The graph of the anti-derivative



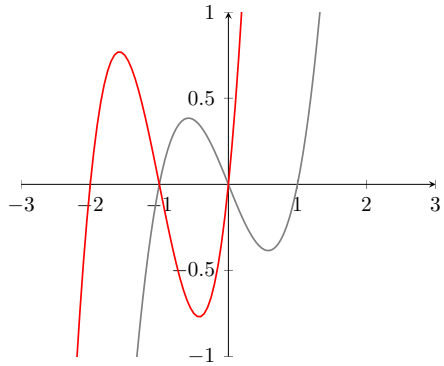
2. (a)



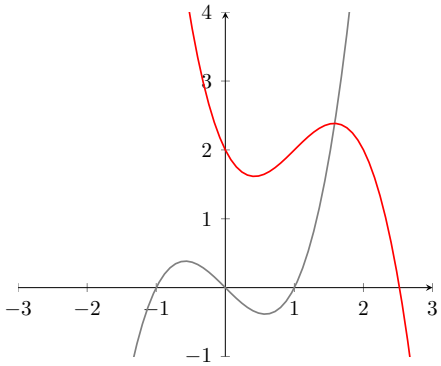
(b) $f'(x) = 3x^2 - 1$. $f''(x) = 6x$.

(c) $f(x)$ is an odd function, while $f'(x)$ is an even function.

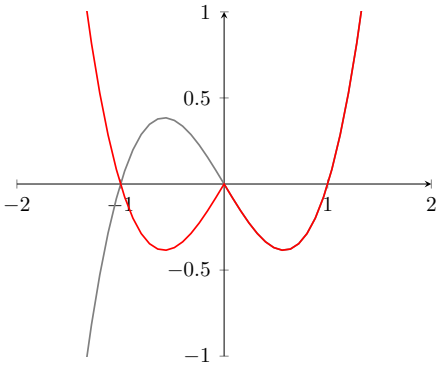
3. (a) $2f(x+1)$



(b) $-f(x-1)+2$



(c) $f(|x|)$



(d) $|f(x)-1|-1$