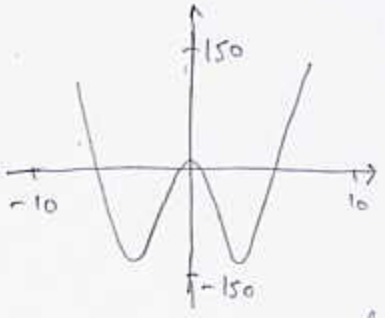
Fall '09/MAT 140/Worksheet 6 **Name:** Solution *Show all your work.*

1. (5pts) Let $f(x) = x^4 - 25x^2 + 7$.
a) Algebraically determine whether this function is even, odd or neither.
b) Sketch the graph and comment how it supports your conclusion from a).

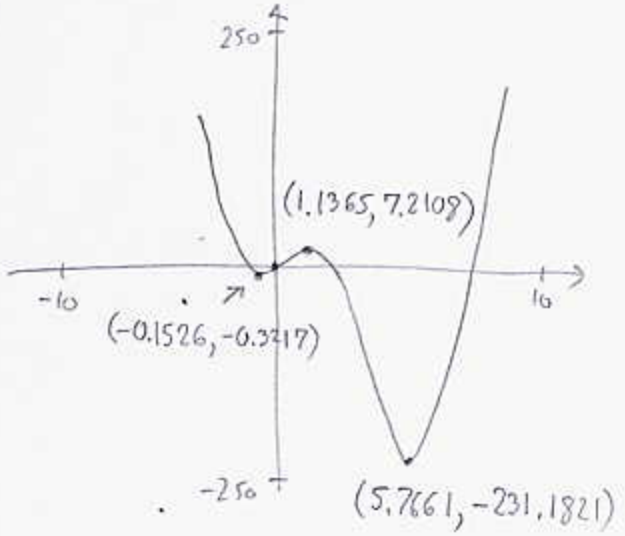
a) $f(-x) = (-x)^4 - 25(-x)^2 + 7$
$= x^4 - 25x^2 + 7 = f(x)$
It is even.



The graph is symmetric about the y-axis, confirming it is even.

2. (7pts) Use your graphing calculator to accurately draw the graph of (on paper!) of $f(x) = x^4 - 9x^3 + 11x^2 + 4x$. Remember to put scale on the graph and find the following (with 4-decimal-point accuracy):
a) Where f has a local maximum and minimum.
b) The intervals of increase and decrease.

a)



a) f has a local maximum
at $x = 1.1365$ with value $y = 7.2108$.
f has a local minimum:
at $x = -0.1526$ with value $y = -0.3217$
at $x = 5.7661$ " $y = -231.1821$

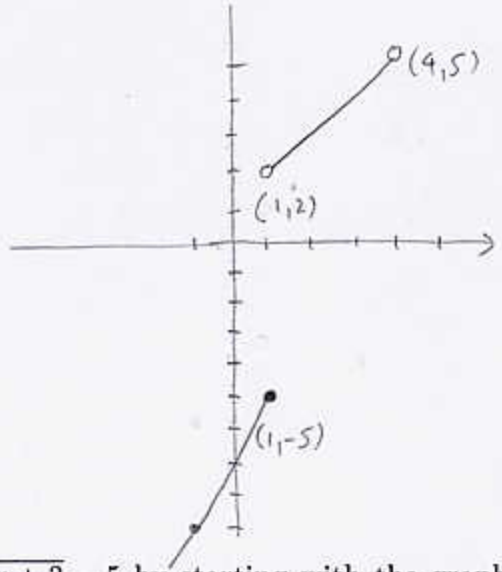
b) f is increasing on
$(-0.1526, 1.1365)$ and $(5.7661, \infty)$
f is decreasing on
$(-\infty, -0.1526)$ and $(1.1365, 5.7661)$

3. (5pts) Sketch the graph of the piecewise-defined function:

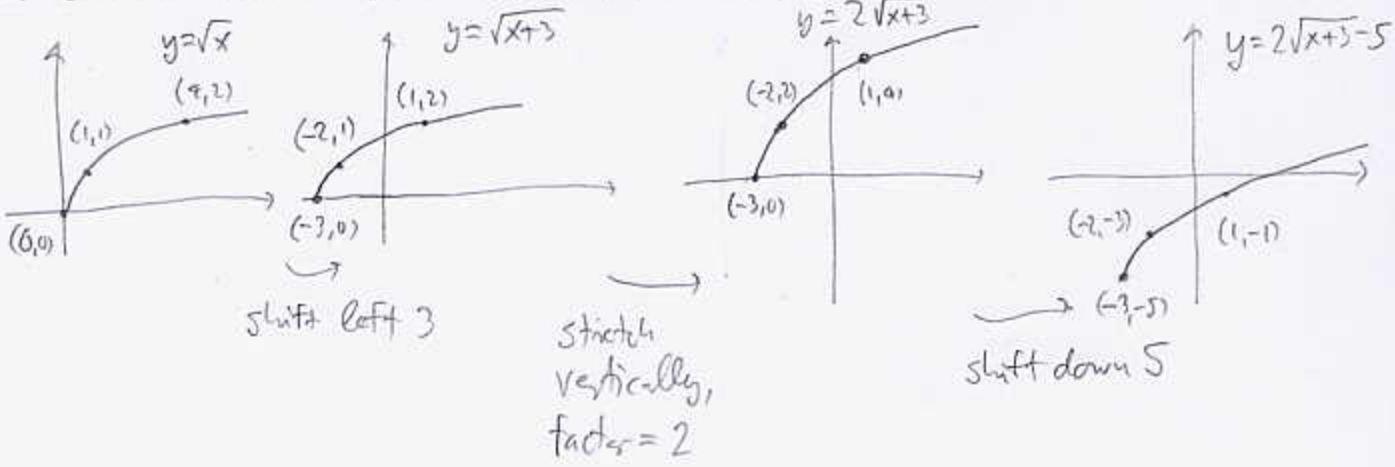
$$f(x) = \begin{cases} 2x - 7, & \text{if } x \leq 1 \\ x + 1, & \text{if } 1 < x < 4. \end{cases}$$

x	$2x-7$
1	-5
-1	-9

x	$x+1$
1	2
4	5



4. (5pts) Draw the graph of $g(x) = 2\sqrt{x+3} - 5$ by starting with the graph of $\sqrt{x}$ and applying transformations. Explain how you transform the graph at every step.



5. (8pts) The graph of $f(x)$ is drawn below. On three separate graphs, sketch the graphs of the functions $f(x) - 4$, $f(3x)$ and $-f(x+1)$ and label all the relevant points.