College Algebra — Joysheet 7
MAT 140, Fall 2014 — D. Ivanšić

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Show all your work!

1. (21pts) For the following functions, determine algebraically whether they odd, even, or neither. Then use the calculator to draw their graphs on paper and verify your conclusions.

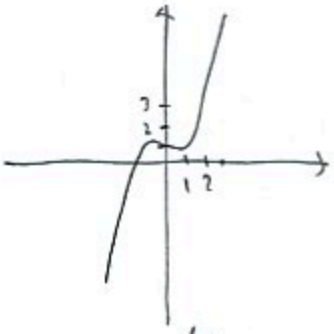
$f(x) = x^3 - x + 1$

$f(-x) = (-x)^3 - (-x) + 1$

$= -x^3 + x + 1 \neq f(x)$

$\neq -f(x)$

neither



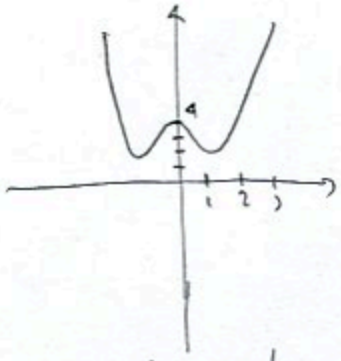
not symmetric

$g(x) = x^4 - 3x^2 + 4$

$g(-x) = (-x)^4 - 3(-x)^2 + 4$

$= x^4 - 3x^2 + 4 = g(x)$

even



symmetric wrt. y-axis

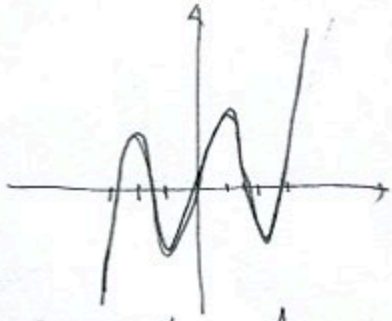
$h(x) = x^5 - 7x^3 + 10x$

$h(-x) = (-x)^5 - 7(-x)^3 + 10(-x)$

$= -x^5 - 7(-x^3) - 10x$

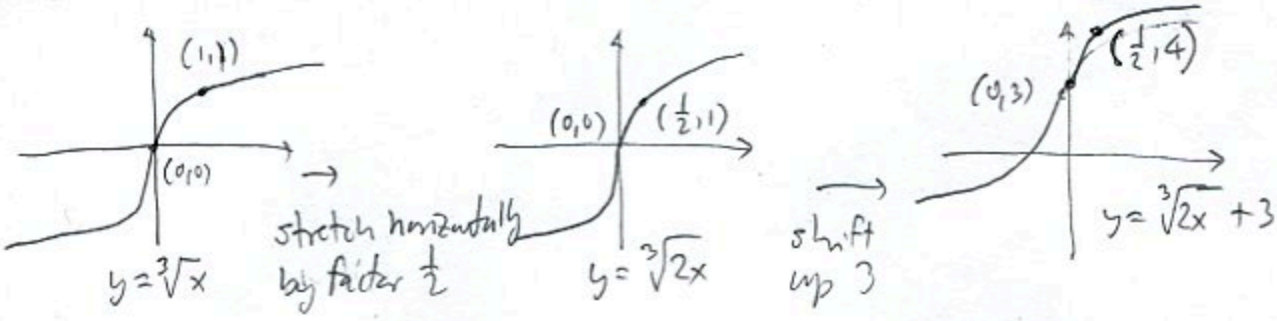
$= -x^5 + 7x^3 - 10x = -h(x)$

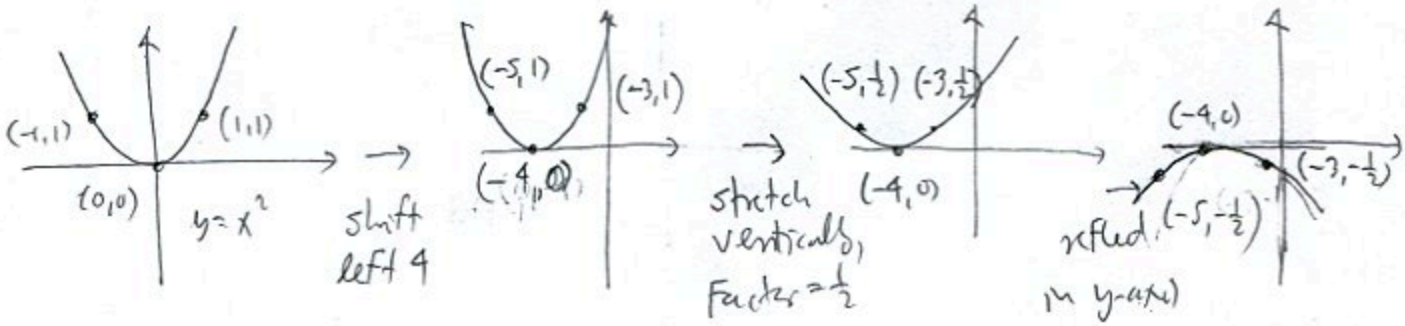
odd



symmetric wrt origin

2. (16pts) Using transformations, draw the graphs of $f(x) = 3 + \sqrt[3]{2x}$ and $g(x) = -\frac{1}{2}(x+4)^2$. Explain how you transform graphs of basic functions in order to get the graphs of f and g.





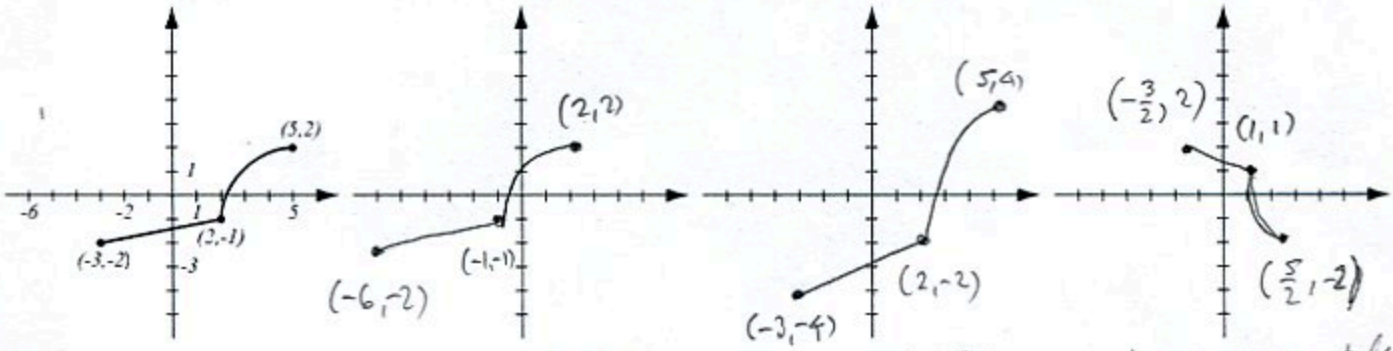
3. (9pts) Write the equation for the function whose graph has the following characteristics:
a) shape of $y = x^3$, shifted down 4 units
b) shape of $y = \frac{1}{x}$, stretched vertically by factor 2, then shifted left 3 units
c) shape of $y = \sqrt{x}$, reflected about the x-axis, then stretched horizontally by factor 3, then shifted up 5 units.

a) $f(x) = x^3 - 4$

b) $f(x) = \dfrac{2}{x+3}$ $\qquad x \mapsto 2 \cdot \frac{1}{x} \mapsto 2 \cdot \frac{1}{x+3}$

c) $f(x) = -\sqrt{\frac{1}{3}x} + 5$ $\qquad \sqrt[3]{x} \to -\sqrt[3]{x} \to -\sqrt{\frac{1}{3}x} \to -\sqrt{\frac{1}{3}x} + 5$

4. (14pts) The graph of $f(x)$ is drawn below. On three separate graphs, sketch the graphs of the functions $f(x+3)$, $2f(x)$ and $-f(2x)$ and label all the relevant points.



shift left 3

stretch vertically factor = $\frac{1}{2}$

stretch horizontally factor = $\frac{1}{2}$, reflect in y-axis