College Algebra — Joysheet 6 MAT 140, Spring 2026 — D. Ivanšič	Name: Saul Ocean *Covers: 2.4, 2.5* *Show all your work!*

1. (21pts) For the following functions:
a) determine algebraically whether they are odd, even, or neither
b) use the calculator to draw their graphs here and verify your conclusions by stating symmetry.

$f(x) = x^5 - 4x^3 + 5x$

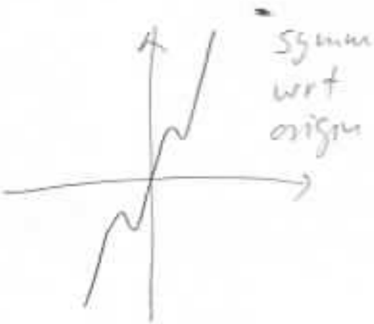
$f(-x) = (-x)^5 - 4(-x)^3 + 5(-x)$
$= -x^5 - 4(-x^3) - 5x$
$= -x^5 + 4x^3 - 5x = -f(x)$
odd

$g(x) = x^4 - 3x^2 + 7$

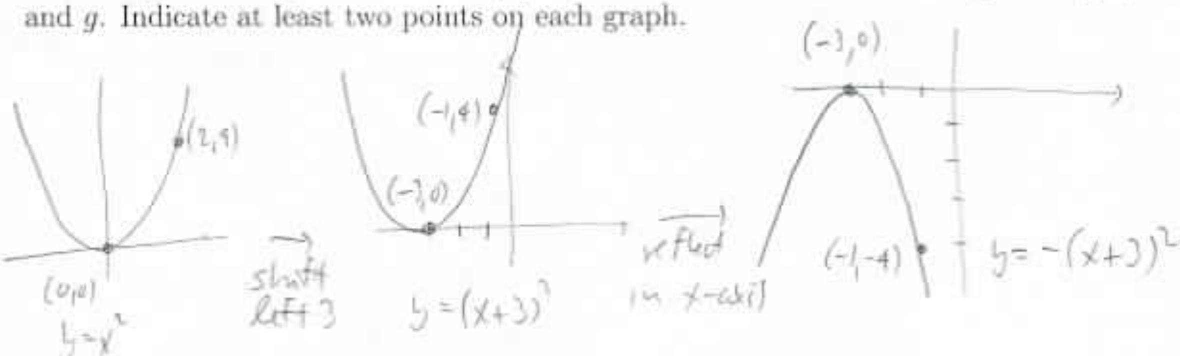
$g(-x) = (-x)^4 - 3(-x)^2 + 7$
$= x^4 - 3x^2 + 7 = g(x)$
even

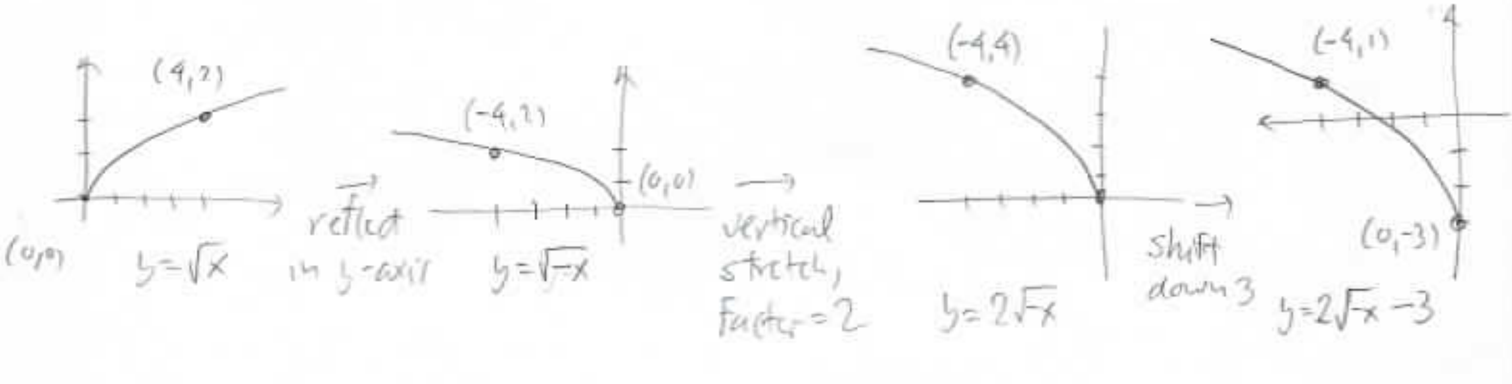
$h(x) = x^3 + 3x^2 - 4x$

$h(-x) = (-x)^3 + 3(-x)^2 - 4(-x)$
$= -x^3 + 3x^2 + 4x \neq h(x), \neq -h(x)$
neither



2. (16pts) Draw the graphs of $f(x) = -(x+3)^2$ and $g(x) = -3 + 2\sqrt{-x}$ using transformations. Explain how you transform graphs of basic functions in order to get the graphs of f and g. Indicate at least two points on each graph.





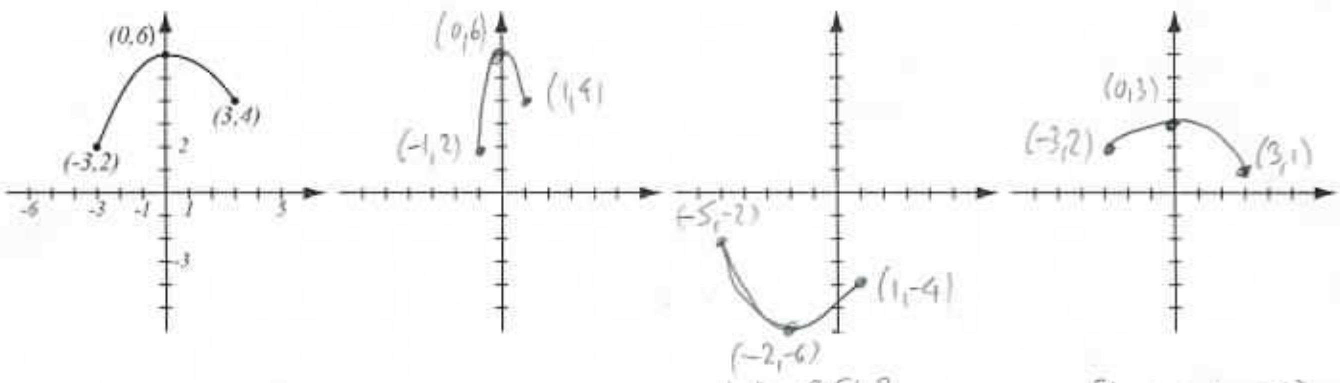
3. (10pts) Write the equation for the function whose graph has the following characteristics:
a) shape of $y = |x|$, shifted right 4 units.
b) shape of $y = x^3$, stretched horizontally by factor 3, then reflected in x-axis
c) shape of $y = \frac{1}{x}$, reflected about the y-axis, then shifted left 3 units, then stretched vertically by factor 4.

a) $y = |x| \rightsquigarrow y = |x-4|$

b) $y = x^3 \rightsquigarrow y = \left(\frac{1}{3}x\right)^3 \rightsquigarrow y = -\left(\frac{1}{3}x\right)^3$

c) $y = \frac{1}{x} \rightsquigarrow y = \frac{1}{-x} \rightsquigarrow y = \frac{1}{-(x+3)} \rightsquigarrow y = 4 \cdot \frac{1}{-(x+3)} = -\frac{4}{x+3}$

4. (13pts) The graph of $f(x)$ is drawn below. On separate coordinate systems, sketch the graphs of the functions $f(3x)$, $-f(x+2)$ and $\frac{1}{2}f(-x)$ and label all the relevant points.



horiz. stretch
Factor = $\frac{1}{3}$

shift left 2
reflect in x-axis

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