Solutions for practice in section 2.2 Polynomials

1. Determine the x-intercepts if possible, the y intercepts, and end behavior and sketch the function. If you cannot find the x-intercepts plot a few points to draw the graph.

$F(x) = x^4-2x^3-3x^2$

$F(0)=0 \qquad (0,0)$

$f(x)=x^4-2x^3-3x^2=$

$=x^2(x^2-2x-3)$

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

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

$=x^2(x+1)(x-3)$

$x=0$ double root

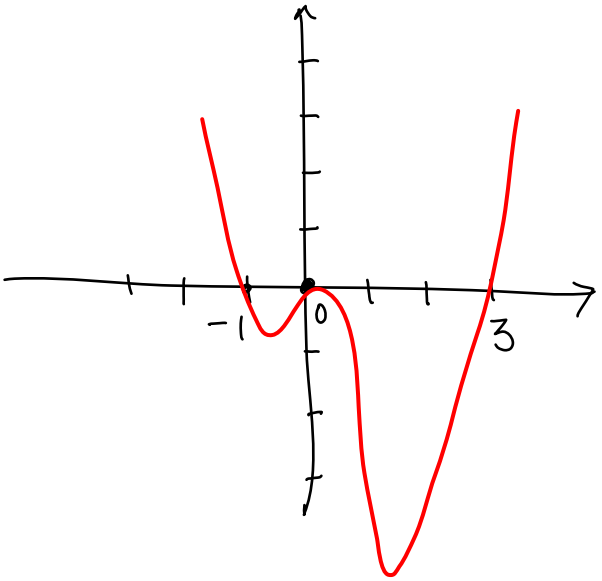
$x=-1$

$x=3$

quartic function, leading coefficient 70, we have

$x \to -\infty \quad F(x) \to +\infty$

$x \to +\infty \quad F(x) \to +\infty$



$G(x) = -x^3+2x-3$

$G(0) = -3 \qquad (0,-3)$

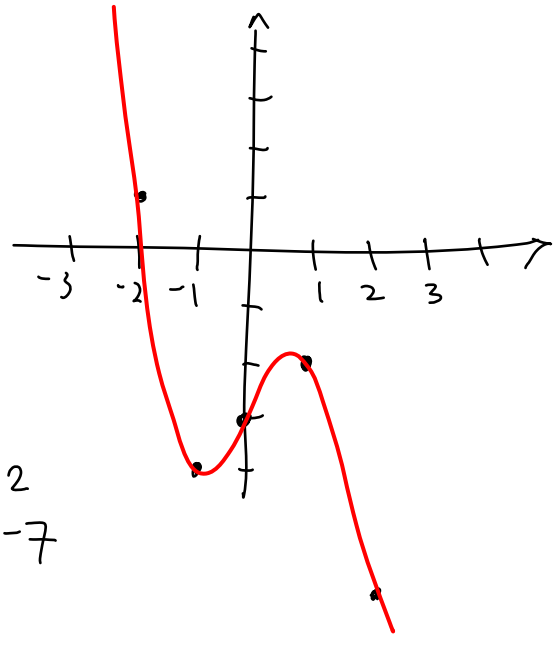
Cubic polynomial w leading coefficient <0, so we'll have

$x \to -\infty \quad G(x) \to +\infty$

$x \to +\infty \quad G(x) \to -\infty$

x	$G(x)$
-3	$27-6-3=19$
-2	$8-4-3=1$
-1	$1-2-3=-4$

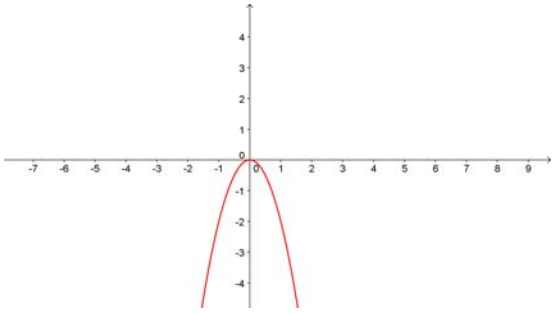
x	$G(x)$
1	$-1+2-3=-2$
2	$-8+4-3=-7$



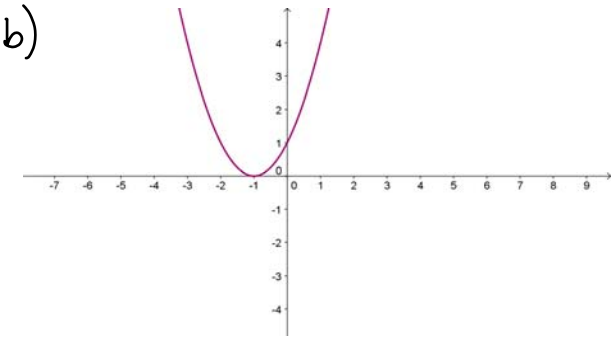
2. Sketch these transformations of $y = x^2$. Quick-draw them

a. $y = -2x^2$ b. $y = (x+1)^2$ c. $y = x^2-3$

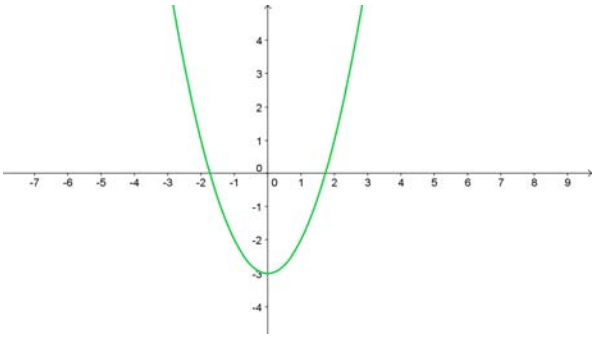
d. $y = -(x-2)^2+3$ e. $y = 0.5(x+2)^2-1$ d. $y = -3x^2-2$



b)



c)



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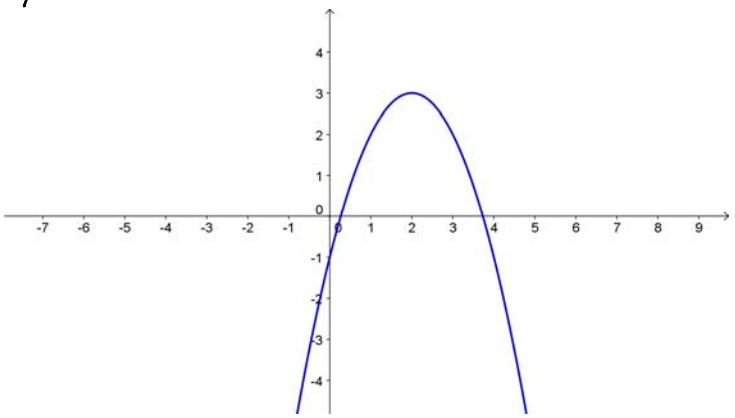
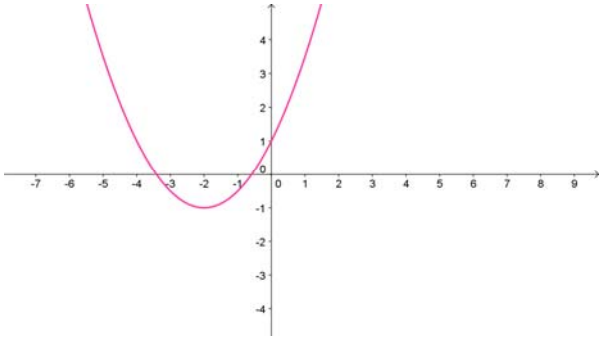
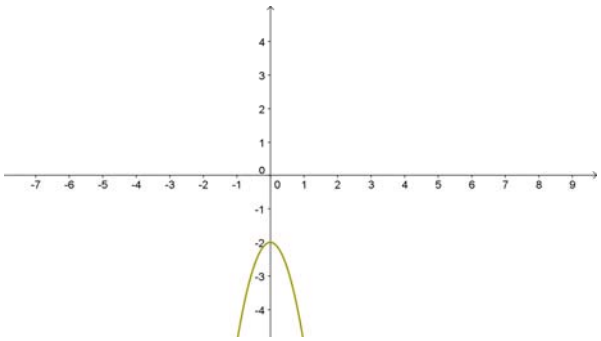


e)



f)



3. Complete the square to sketch these quadratic functions using transformations. State the vertex, axis of symmetry and the x- intercepts and the y-intercept of each.

a. $y = 3x^2 - 6x + 2$ b. $y = -x^2+8x -5$

a) $y = 3x^2-6x+2 = 3\left(x^2-2x+1-1\right)+2 =$

$= 3\left(x^2-2x+1\right)-3+2 = 3(x-1)^2-1$

Vertex : $(1,-1)$

axis : $x=1$

y-intercept : $(0,2)$

x-intercept : $3(x-1)^2-1=0$

$3(x-1)^2=1$

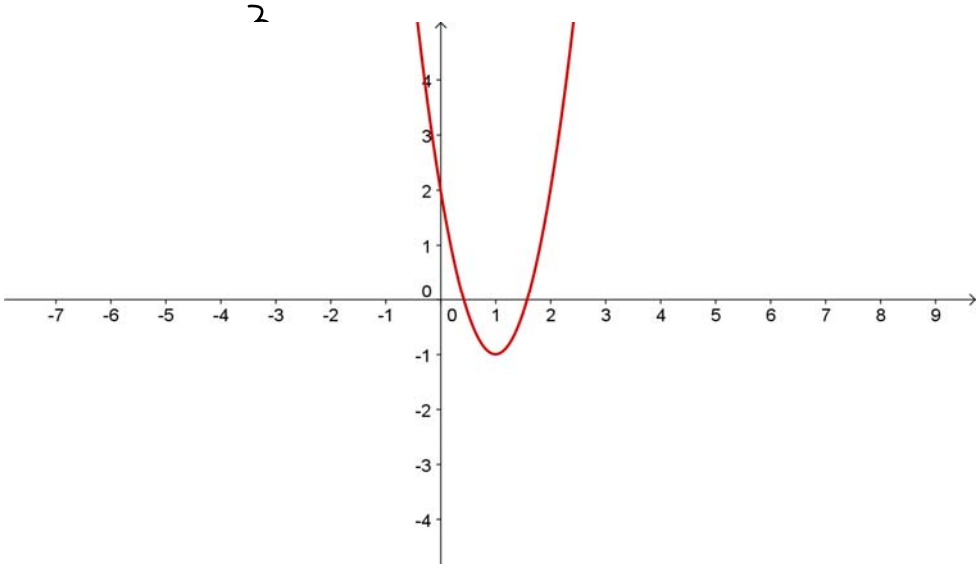
$(x-1)^2=\frac{1}{3}$

$x-1=\pm\frac{\sqrt{3}}{3}$

$x=1\pm\frac{\sqrt{3}}{3}$

$\left(1+\frac{\sqrt{3}}{3},0\right)$

$\left(1-\frac{\sqrt{3}}{3},0\right)$



b. $y = -x^2+8x -5$

$y = -x^2+8x-5 = -(x^2-8x+16-16)-5 =$

$= -(x^2-8x+16)+16-5 = -(x-4)^2+11$

Vertex: $(4, 11)$

axis: $x = 4$

y-intercept $(0, -5)$

x-intercept: $-(x-4)^2+11=0$

$(x-4)^2 = 11$

$x-4 = \pm\sqrt{11}$

$x = 4 \pm \sqrt{11}$

$(4+\sqrt{11}, 0)$

$(4-\sqrt{11}, 0)$