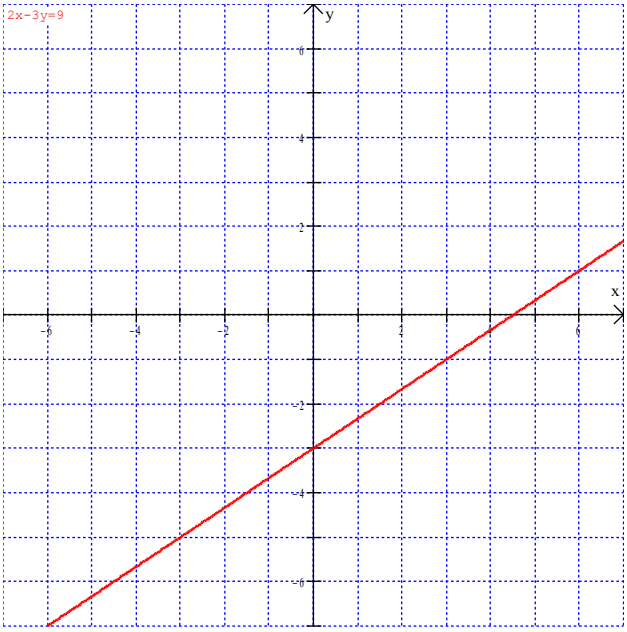
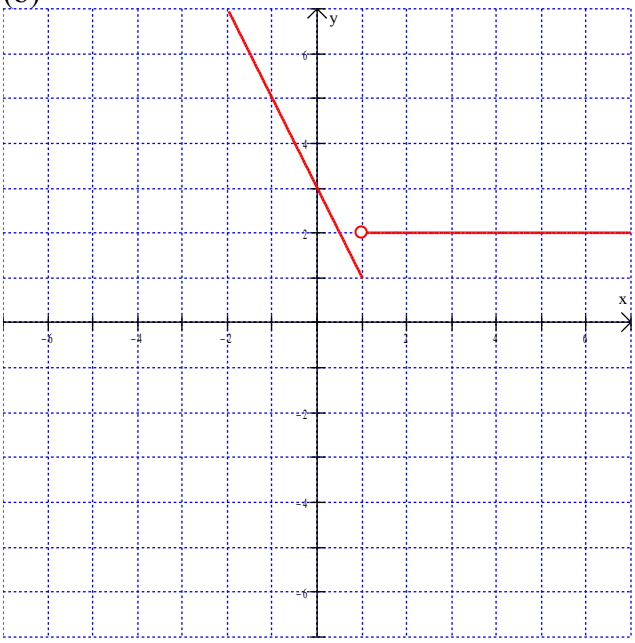
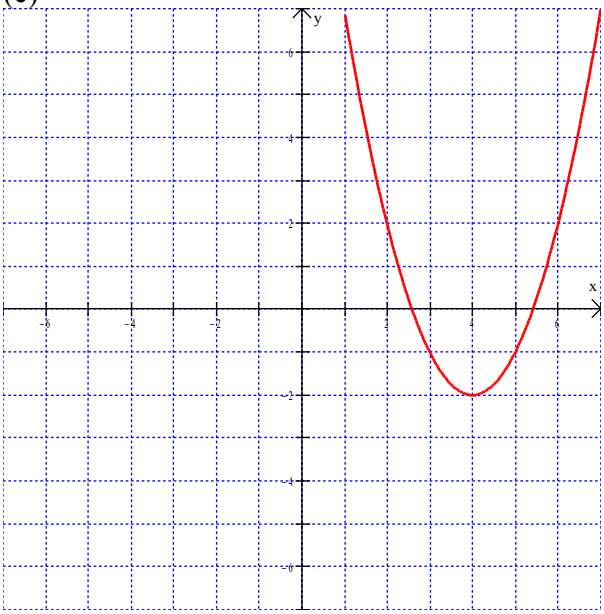
1(a)



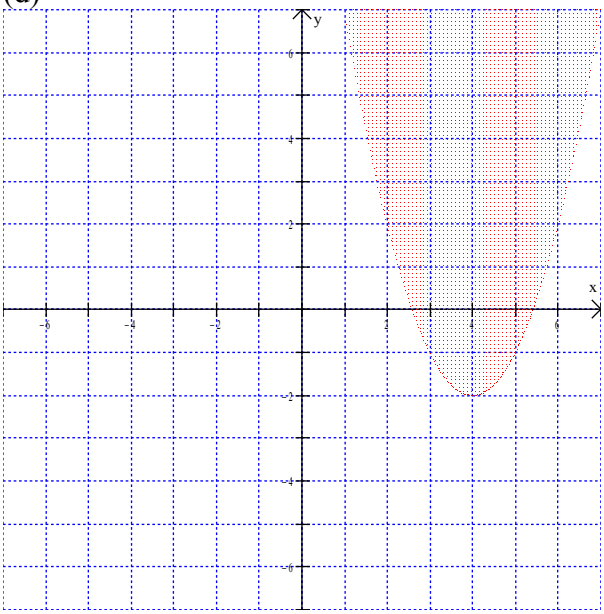
(b)



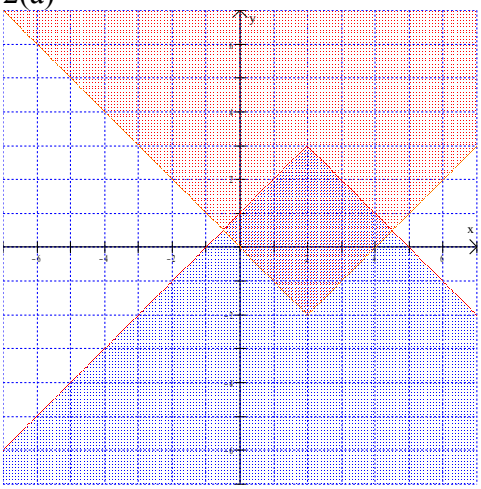
(c)



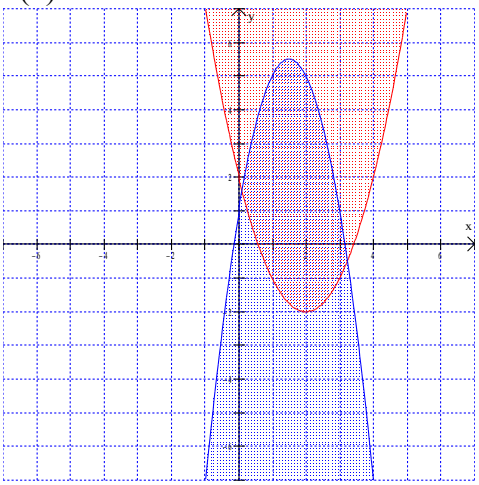
(d)



2(a)



2(b)



3.(a) $x = \dfrac{3 \pm \sqrt{69}}{2}$

(b)

$$3(x+4)^2 = -27$$
$$(x+4)^2 = -9$$
$$x+4 = \pm 3i$$
$$x = -4 \pm 3i$$

(c)

$$11m^2 - 1 = 7m^2 + 2$$
$$4m^2 = 3$$
$$m^2 = \frac{3}{4}$$
$$m = \pm \frac{\sqrt{3}}{2}$$

(d) $x = -3 \pm i\sqrt{3}$ are the roots. But since these are not real roots, and the parabola opens upwards, there are no values of x which will make $\frac{1}{2}x^2 + 3x + 6 \le 0$. There are no solutions.

4. (a) $A = \begin{bmatrix} 3 & 2 \\ -2 & 5 \end{bmatrix}$ (b) $A^{-1} = \frac{1}{19}\begin{bmatrix} 5 & -2 \\ 2 & 3 \end{bmatrix}$ (c) $\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{19}\begin{bmatrix} 5 & -2 \\ 2 & 3 \end{bmatrix}\begin{bmatrix} -8 \\ 18 \end{bmatrix} = \begin{bmatrix} -4 \\ 2 \end{bmatrix}$

5. (a)

$$0 = c$$
$$110 = 4a + 2b$$
$$150 = 9a + 3b$$

Solving the system above gives $(a, b, c) = (-5, 65, 0)$. So the equation of the parabola is

$$y = -5x^2 + 65x$$

(b)

$$0 = -5x^2 + 65x$$
$$0 = -5x(x - 13)$$
$$x = 0 \text{ or } x = 13$$

So, the rocket hits the ground in 13 seconds.

(c) The x-coordinate of the vertex is 6.5 seconds. So the maximum height is

$$y = -5(6.5)^2 + 65(6.5) = 211.25 \text{ feet}$$