The function $f(x,y) = y^2 - x^2$ has a **saddle point** at $(x,y) = (0,0)$.
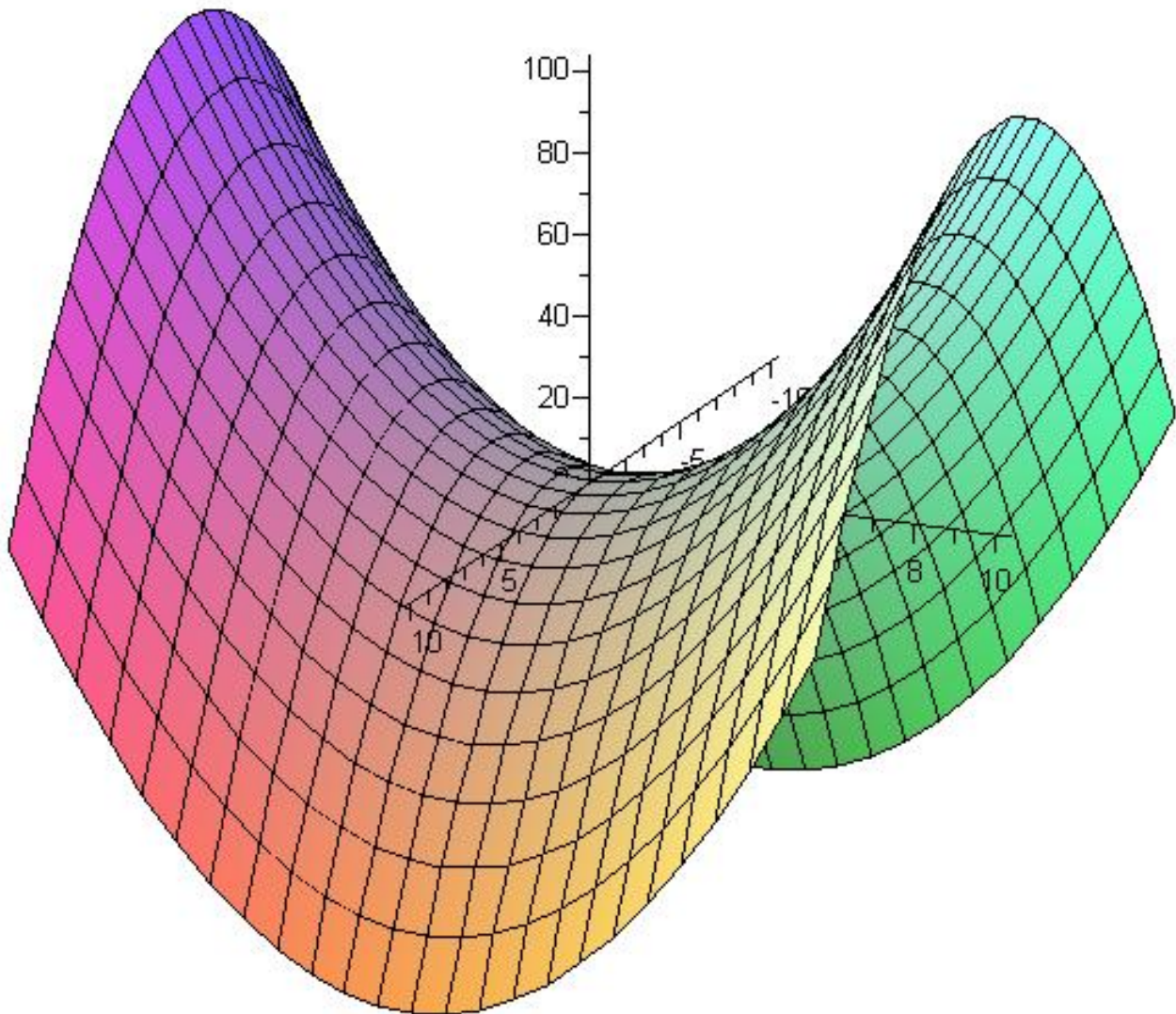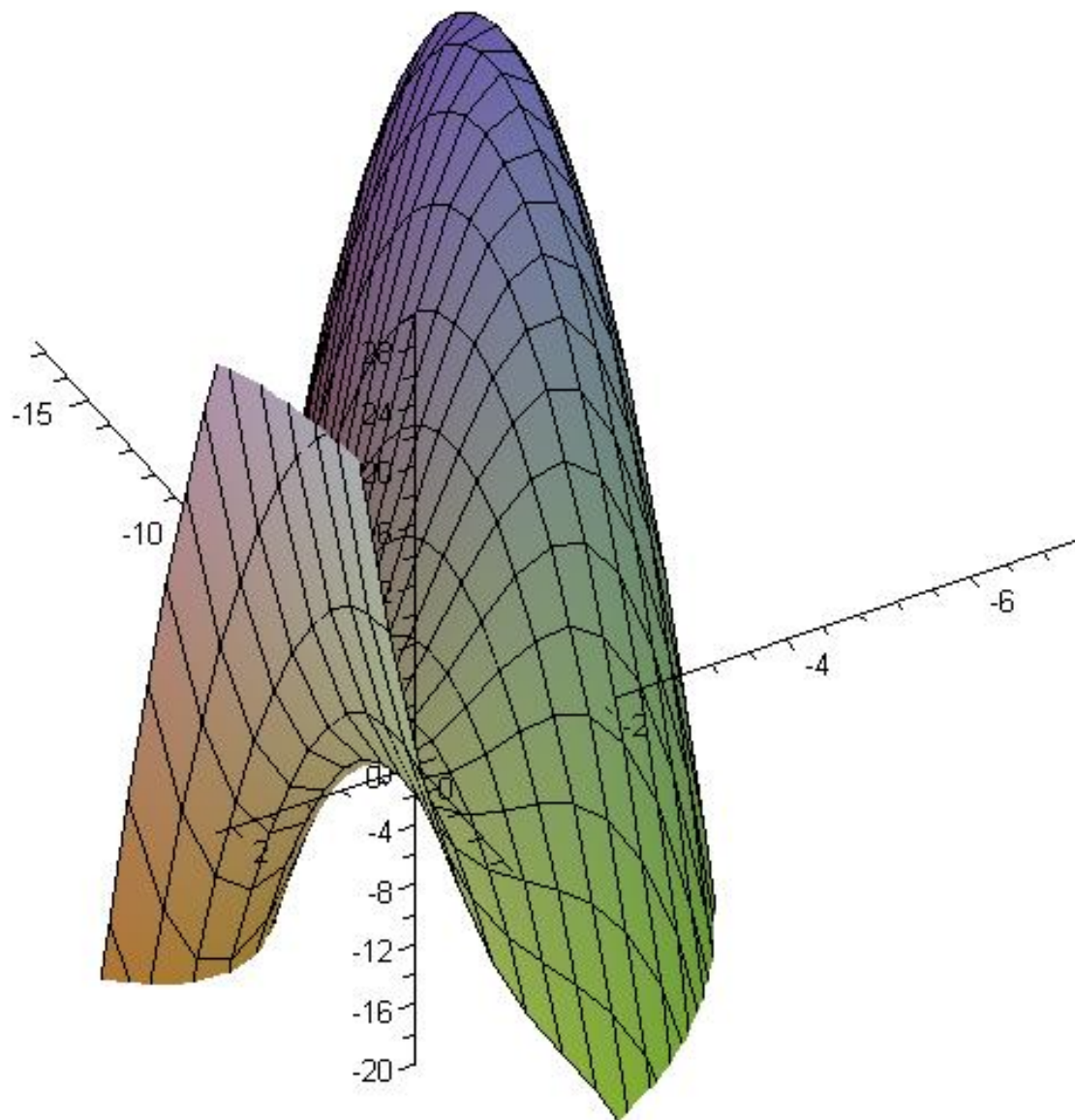

The surface

$$f(x,y) = 3xy - (1/2)y^2 + 2x^3 + (9/2)x^2$$
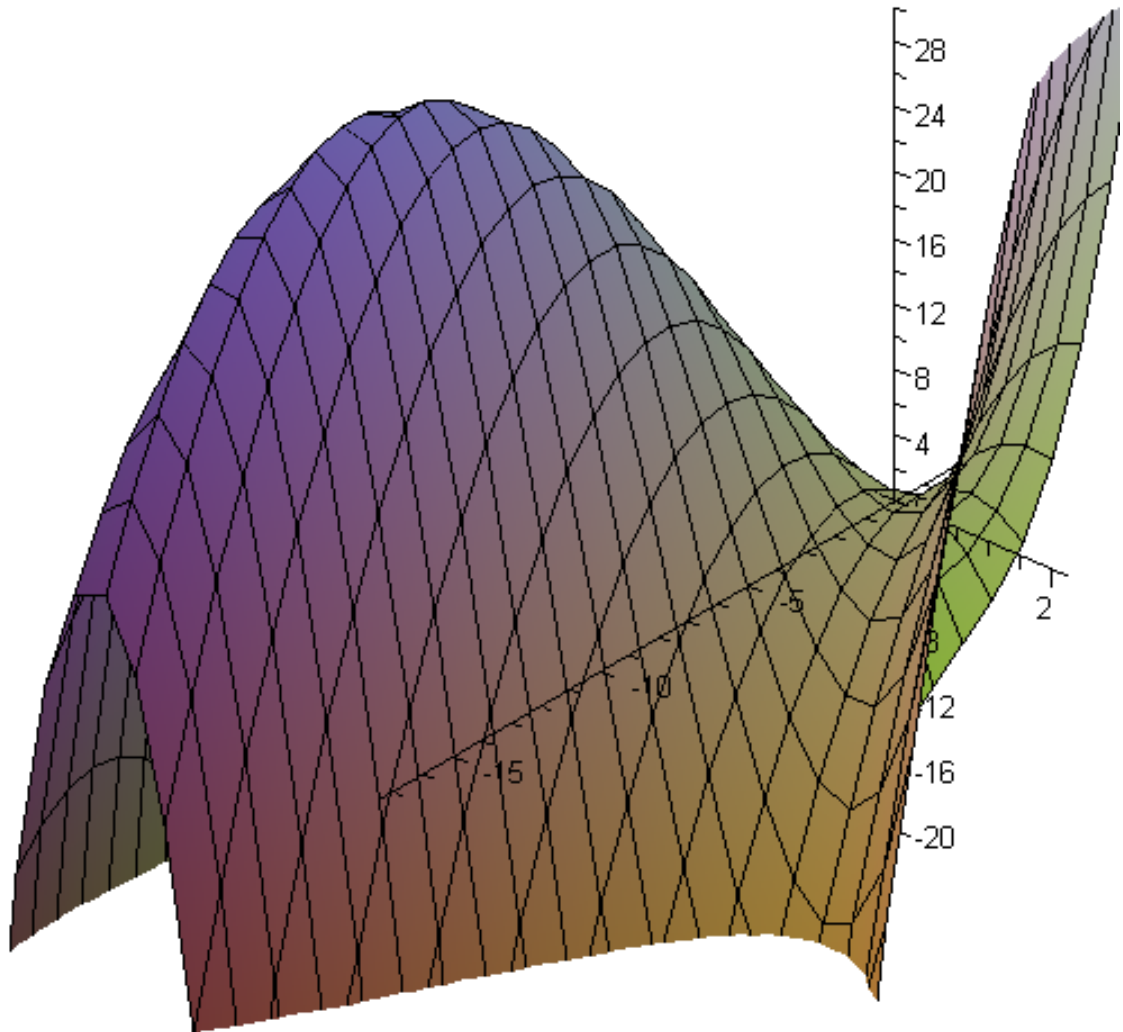
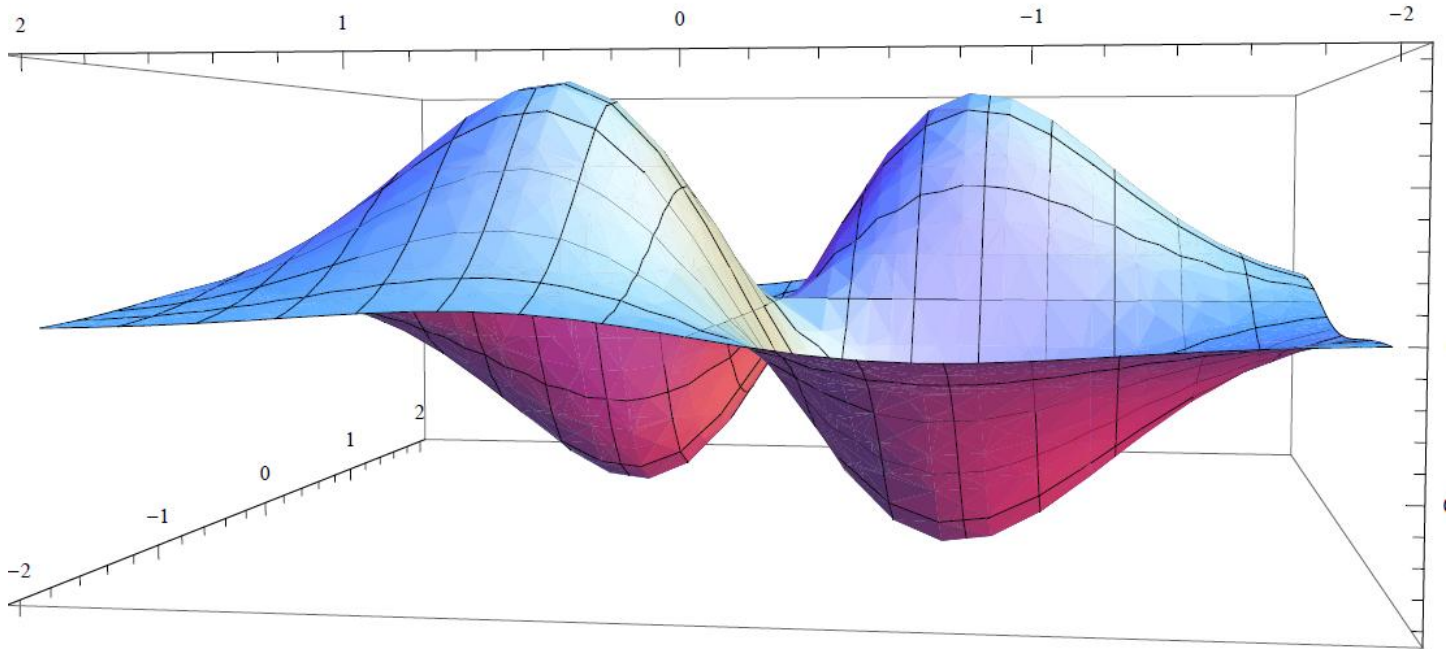(positive x-axis, positive y-axis view)

The surface
$f(x,y) = 3xy - (1/2)y^2 + 2x^3 + (9/2)x^2$
(positive x-axis, negative y-axis view)

The graph of the surface
$$f(x,y) = xye^{-x^2-y^2}$$

$$f(x,y) = \tfrac{1}{4}\,x + \tfrac{1}{2}\,y^2 - xy + 1$$
over the triangular region given by
the points (0,-1), (0,1), (2,-1)