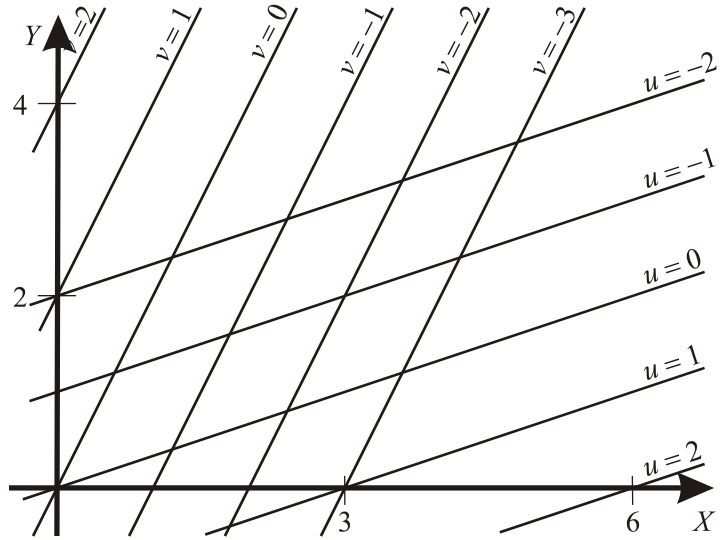
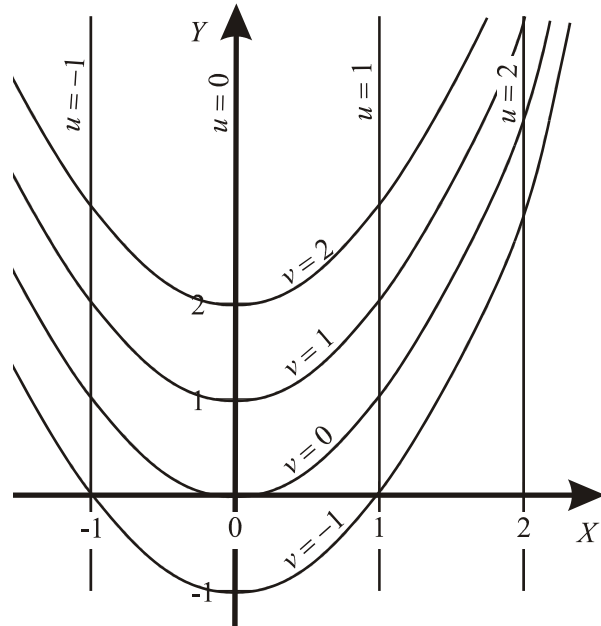


## Three Coordinate Systems for the Plane (Each with a Cartesian System)

1. Relative to the  $\{(x, y)\}$  system, the curves  $u = u_0$  and  $v = v_0$  are straight lines with slopes  $\frac{1}{3}$  and 2, respectively. The  $u = u_0$  curve crosses the  $X$ -axis at  $x = 3u_0$ , and the  $v = v_0$  curve crosses the  $Y$ -axis at  $y = 2v_0$ . (See the figure to the right.)



2. Relative to the  $\{(x, y)\}$  system, the curve  $u = u_0$  is the straight line  $x = u_0$ , and the curve  $v = v_0$  is the parabola  $y = x^2 + v_0$ . (See the figure to the right.)



3. This  $\{(u, v)\}$  system is just for the upper half plane. It is related to the  $\{(x, y)\}$  system by

$$\begin{aligned} y &= u e^x && \text{(with } u > 0\text{)} \\ y &= v e^{-x} && \text{(with } v > 0\text{)} \end{aligned}$$