

65 The number of hours on machine A needed to manufacture  $x$  units of part X is  $4x$  while the number of hours on machine A needed to manufacture  $y$  units of part Y is  $1y$ . Since machine A is only available for 40 hours each week we have the constraint  $4x + y \leq 40$ . Similarly, the number of hours on machine B needed to manufacture  $x$  units of part X is  $2x$  while the number of hours on machine B needed to make  $y$  units of part Y is  $3y$ . Since machine B is only available for 30 hours each week we have the constraint  $2x + 3y \leq 30$ . It should be noted that the number of parts of each type cannot be negative. This gives the constraints  $x \geq 0$  and  $y \geq 0$ . The profit earned on  $x$  units of part X is  $500x$  while the profit earned for  $y$  units of part Y is  $600y$ . Thus, the total weekly profit is  $P = 500x + 600y$ . This is our objective function. Graph the constraints and shade the region. The region of feasible solutions is shown in *Figure 65*. The vertices of this region are  $(0, 0)$ ,  $(10, 0)$ ,  $(9, 4)$ , and  $(0, 10)$ . To find the maximum value of  $P$  in the region we must evaluate  $P$  at each of the vertices. These values are shown in the table.

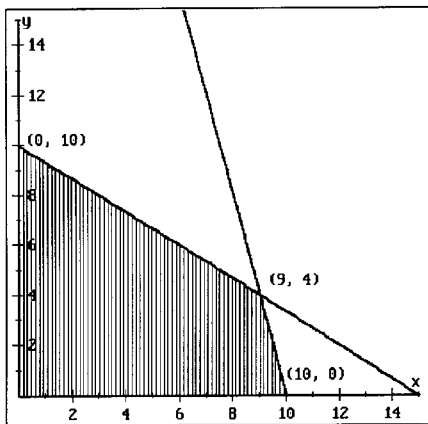


Figure 65

Vertex	$P = 500x + 600y$
$(0, 0)$	$500(0) + 600(0) = 0$
$(10, 0)$	$500(10) + 600(0) = 5000$
$(9, 4)$	$500(9) + 600(4) = 6900$
$(0, 10)$	$500(0) + 600(10) = 6000$

From the table the maximum is 6900 at the point  $(9, 4)$ . The maximum profit is \$6900 when there are 9 parts of type X and 4 parts of type Y manufactured.