

#2 Let  $x = \#$  of type A machines, Let  $y = \#$  of type B machines  
 We want to minimize  $z = 15,000x + 20,000y$   
 What are the constraints? The machines must fold at least 320 boxes/min, so,  $30x + 50y \geq 320$ . The number of employees cannot exceed 12, so  $x + 2y \leq 12$ . Also,  $x \geq 0, y \geq 0$ .

#4 Let  $x = \#$  acres of corn,  $y = \#$  acres of soybeans, let  $z = \#$  acres of oats. We want to minimize  $z = 40x + 30y + 20z$ . What are the constraints? The  $\#$  of available acres is at most 12. So,  $x + y + z \leq 12$ . The capital available is at most 360. So,  $36x + 24y + 18z \leq 360$ . The time available is at most 48. So,  $6x + 6y + 2z \leq 48$ .

#6 Let  $x = \#$  barrels produced using the four-field emission control. Let  $y = \#$  barrels produced using the five-fold emission control. We want to minimize  $z = 0.14x + 0.18y$ . What are the constraints? There is a desired yearly capacity, so  $x + y = 2,500,000$ . It is desired to reduce emissions by 85%, so  $1.5x + 1.8y \leq (2x \cdot 84)$ . Also,  $x \geq 0, y \geq 0$ .

#8 Let  $x =$  amount in utilities stock. Let  $y =$  amount in electronic stock. Let  $z =$  amount in a bond. We want to maximize  $w = .09x + .04y + .05z$ . What are the constraints?  
 $x + y + z \leq 200,000$ ,  $x + y \leq \frac{1}{2}(x + y + z)$ ,  $x \leq 40,000$   
 $z \geq 70,000$