Example 1: Product mix problem with diminishing profit margin.

Your company manufactures TVs, stereos and speakers, using a common parts inventory of power supplies, speaker cones, etc. Parts are in limited supply and you must determine the most profitable mix of products to build. But your profit per unit built decreases with volume because extra price incentives are needed to load the distribution channel.

Color Coding

	Target cell
	Changing cells
	Constraints

			TV set	Stereo	Speaker
	Number to Build->		100	100	100
Part Name	Inventory	No. Used			
Chassis	450	200	1	1	0
Picture Tube	250	100	1	0	0
Speaker Cone	800	500	2	2	1
Power Supply	450	200	1	1	0
Electronics	600	400	2	1	1

Diminishing
Returns
Exponent:
0.9

Profits:

		TV set	Stereo	Speaker
By Product		$4,732	$3,155	$2,208
Total	$10,095			

This model provides data for several products using common parts, each with a different profit margin per unit. Parts are limited, so your problem is to determine the number of each product to build from the inventory on hand in order to maximize profits.

Problem Specifications

Target Cell	D18	Goal is to maximize profit.
Changing cells	D9:F9	Units of each product to build.
Constraints	C11:C15<=B11:B15	Number of parts used must be less than or equal to the number of parts in inventory.
	D9:F9>=0	Number to build value must be greater than or equal to 0.

The formulas for profit per product in cells D17:F17 include the factor ^H15 to show that profit per unit diminishes with volume. H15 contains 0.9, which makes the problem nonlinear. If you change H15 to 1.0 to indicate that profit per unit remains constant with volume, and then click **Solve** again, the optimal solution will change. This change also makes the problem linear.