		Product					
Info from the Case		1	2	3			
Batches Produced		26.19	54.76	20.00			
Profit per Batch:		$ 50	$ 20	$ 25	$ 2,905	Objective	
					Hours Used	Hours Available	
Constraints:	Milling	9.00	3.00	5.00	500	<=	500
(Machine Hours)	Lathe	5.00	4.00	0.00	350	<=	350
	Grinder	3.00	0.00	2.00	118.571429	<=	150

Maximize: $Z = 50x_1 + 20x_2 + 25x_3$

Subject to:

$9x_1 + 3x_2 + 5x_3 \leq 500;$

$5x_1 + 4x_2 + 0x_3 \leq 350;$

$3x_1 + 0x_2 + 2x_3 \leq 150;$

and: $x_1 \geq 0,$ $x_2 \geq 0,$ $x_3 \geq 0$

While not specified, I've included the reports that Solver can optionally produce. The Sensitivity Report shows that the limitations of machine hours available with milling and lathing are binding, which corresponds to the results above showing that those processes are being used at maximum capacity. Grinding, which is not used at or even near capacity, has a $0 shadow price. Of the two resources with binding constraints, milling is the most expensive. Omega could gain an additional $5 per machine hour available for the milling machine. SImilarly, they could gain an additional $1.5 per machine hour available for the lathe. This means that Omega might consider investing in increasing the capacity if the cost of doing so would be less than the amount gained.

Microsoft Excel 16.0 Answer Report
Worksheet: [Book1]Sheet1
Report Created: 7/15/2018 3:51:05 PM
Result: Solver found a solution. All Constraints and optimality conditions are satisfied.
Solver Engine

Engine: Simplex LP
Solution Time: 0.031 Seconds.
Iterations: 4 Subproblems: 0

Solver Options

Max Time Unlimited, Iterations Unlimited, Precision 0.000001
Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 1%, Assume NonNegative

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$G$5	Profit per Batch:	$ -	$ 2,938

Variable Cells

Cell	Name	Original Value	Final Value	Integer
$D$4	Batches Produced Product	0.00	0.00	Contin
$E$4	Batches Produced	0.00	87.50	Contin
$F$4	Batches Produced	0.00	47.50	Contin

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$G$10	Grinder Hours Used	95	$G$10<=$I$10	Not Binding	55
$G$8	Milling Hours Used	500	$G$8<=$I$8	Binding	0
$G$9	Lathe Hours Used	350	$G$9<=$I$9	Binding	0

Microsoft Excel 16.0 Sensitivity Report
Worksheet: [Book1]Sheet1
Report Created: 7/15/2018 3:51:05 PM

Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$D$4	Batches Produced Product	0	-1.25	50	1.25	1E+30
$E$4	Batches Produced	87.5	0	20	1E+30	1
$F$4	Batches Produced	47.5	0	25	8.333333333	1.19047619

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$G$10	Grinder Hours Used	95	0	150	1E+30	55
$G$8	Milling Hours Used	500	5	500	137.5	237.5
$G$9	Lathe Hours Used	350	1.25	350	316.6666667	183.3333333

Microsoft Excel 16.0 Limits Report
Worksheet: [Book1]Sheet1
Report Created: 7/15/2018 3:51:06 PM

Cell	Objective Name	Value
$G$5	Profit per Batch:	$ 2,938

Cell	Variable Name	Value	Lower Limit	Objective Result	Upper Limit	Objective Result
$D$4	Batches Produced Product	0.00	0.00	2937.50	0.00	2937.50
$E$4	Batches Produced	87.50	0.00	1187.50	87.50	2937.50
$F$4	Batches Produced	47.50	0.00	1750.00	47.50	2937.50

Info from the Case		Product 1	Product 2			
Batches Produced		3.00	9.00			
Profit per Batch:		$ 10	$ 20	$ 210	Objective (Maximize Contribution)	
				Hours Used		Hours Available
Constraints:	Milling	(1.00)	2.00	15	<=	15
(Machine Hours)	Lathe	1.00	1.00	12	<=	12
	Grinder	5.00	3.00	42	<=	45

Maximize: $Z = 50x_1 + 20x_2 + 25x_3$

Subject to:

$9x_1 + 3x_2 + 5x_3 \leq 500;$

$5x_1 + 4x_2 + 0x_3 \leq 350;$

$3x_1 + 0x_2 + 2x_3 \leq 150;$

and:

$x_1 \geq 0,$

$x_2 \geq 0,$

$x_3 \geq 0$

Microsoft Excel 16.0 Answer Report
Worksheet: [3b_hw2_solverExcel_due_07-15-2018.xlsx]Sheet1
Report Created: 7/18/2018 1:38:18 PM
Result: Solver found a solution. All Constraints and optimality conditions are satisfied.
Solver Engine

Engine: Simplex LP
Solution Time: 0.031 Seconds.
Iterations: 2 Subproblems: 0

Solver Options

Max Time Unlimited, Iterations Unlimited, Precision 0.000001, Use Automatic Scaling
Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 1%, Assume NonNegative

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$F$7	Profit per Batch:	$ -	$ 210

Variable Cells

Cell	Name	Original Value	Final Value	Integer
$D$6	Batches Produced Product	0.00	3.00	Contin
$E$6	Batches Produced	0.00	9.00	Contin

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$F$10	Milling Hours Used	15	$F$10<=$H$10	Binding	0
$F$11	Lathe Hours Used	12	$F$11<=$H$11	Binding	0
$F$12	Grinder Hours Used	42	$F$12<=$H$12	Not Binding	3

Microsoft Excel 16.0 Sensitivity Report
Worksheet: [3b_hw2_solverExcel_due_07-15-2018.xlsx]Sheet1
Report Created: 7/18/2018 1:38:18 PM

Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$D$6	Batches Produced Product	3	0	10	10	20
$E$6	Batches Produced	9	0	20	1E+30	10

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$F$10	Milling Hours Used	15	3.333333333	15	9	4.5
$F$11	Lathe Hours Used	12	13.33333333	12	0.692307692	4.5
$F$12	Grinder Hours Used	42	0	45	1E+30	3

Microsoft Excel 16.0 Limits Report
Worksheet: [3b_hw2_solverExcel_due_07-15-2018.xlsx]Sheet1
Report Created: 7/18/2018 1:38:19 PM

Cell	Objective Name	Value
$F$7	Profit per Batch:	$ 210

Cell	Variable Name	Value	Lower Limit	Objective Result	Upper Limit	Objective Result
$D$6	Batches Produced Product	3.00	3.00	210.00	3.00	210.00
$E$6	Batches Produced	9.00	0.00	30.00	9.00	210.00