To do

① Work through G+W example:

$$\max \quad z = 4g + 3w$$

s.t.

$$2g + 4w \leq 40 \quad \text{[Artisan hours]}$$

$$g + w \leq 12 \quad \text{[Paint l]}$$

$$6g + 2w \leq 60 \quad \text{[Plastic kg]}$$

$$g, w \geq 0 \quad \text{[non-negativity]}$$

a) Let's graphically try and solve the problem.

Two approaches - corner point.
- Iso profit line.

② 4 special cases - refer to text-book + illustrate with Geogebra.

③ Slack + surplus

- Slack: $\leq$ constraint, resources not used. (available - consumed)
- Surplus: $\geq$ constraint, more than the min. (Actual) - (minimum)

zero slack/surplus = "binding"

④ Sensitivity Analysis

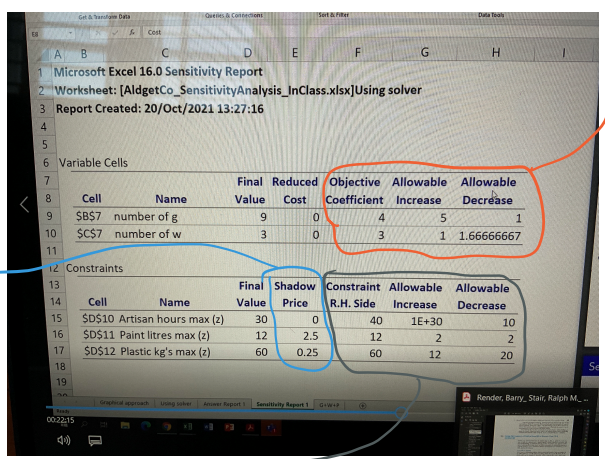
"What if ...?"

⇒ Using Solver < Solve LP
Generate sensitivity report.

→ Input dialogue
→ Before press "OK" → solver results
tick answer + sensitivity report.

→ What does answer report tell us?

→ Sensitivity report ...



Microsoft Excel 16.0 Sensitivity Report
Worksheet: [AldgetCo_SensitivityAnalysis_InClass.xlsx]Using solver
Report Created: 20/Oct/2021 13:27:16

Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
B7	number of g	9	0	4	5	1
C7	number of w	3	0	3	1	1.66666667

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
D10	Artisan hours max (z)	30	0	40	1E+30	10
D11	Paint litres max (z)	12	2.5	12	2	2
D12	Plastic kg's max (z)	60	0.25	60	12	20

How much we are willing to pay for one extra unit of a binding resource.

Range of values over which the obj. func. coeff can change, before a new corner point becomes the optimal solution.

- Changing the RHS values changes the feasible region (unless the constraint is redundant).
- Often, the optimal solution will change
- Shadow prices are relevant between the LB+UB.

Reduced cost → amount by which an obj. func. coeff. of a non-basic variable at the optimal solution must improve, before it will be taken up in the optimal solution...

example → G + W + P

Currently: make 0 puzzles.

Obj. func. coeff. for puzzles needs to improve by 1.25 before we will start to make puzzles.

Report Created: 20/Oct/2021 14:07:07

Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
B16	number of g	9	0	4	5	1
C16	number of w	3	0	3	1	0.71428571
D16	number of p	0	-1.25	5	1.25	1E+30

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
E19	Artisan hours max (z)	30	0	40	1E+30	10
E20	Paint litres max (z)	12	2.5	12	2	2
E21	Plastic kg's max (z)	60	0.25	60	12	20

Graphical approach | Using solver | Answer Report 1 | Sensitivity Report 1 | G+W+P | Answer Report 2 | Sensitivity Report 2

Ready

Also shadow: if we "force" 1 puzzle i.e. take away resources from other 2 products (use shadow prices).