



**DS235**

**Introduction to Decision Science**

# **DADM EXCEL ADD IN**

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# CONTENTS

- 1 Installation for Windows
- 2 Installation for Mac
- 3 Monte Carlo
- 4 Decision Trees



- 1 Installation for Windows**
- 2 Installation for Mac**
- 3 Monte Carlo**
- 4 Decision Trees**



# 1. DOWNLOAD THE ADD IN

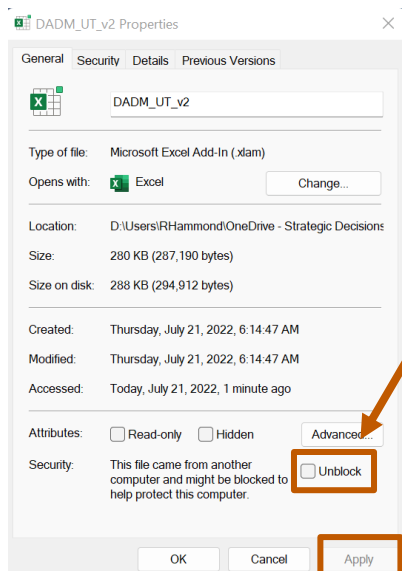
- Download and save the add-in to your computer in a folder that you can easily find.
  - Save the add-in to a folder where you can keep it indefinitely, such as the Documents folder or a folder where you keep modeling tools.
  - When you install DADM, it will load automatically each time you open Excel. After installing it, you can de-activate the add-in if you do not want it to load.



## 2. UNBLOCK THE ADD-IN FILE

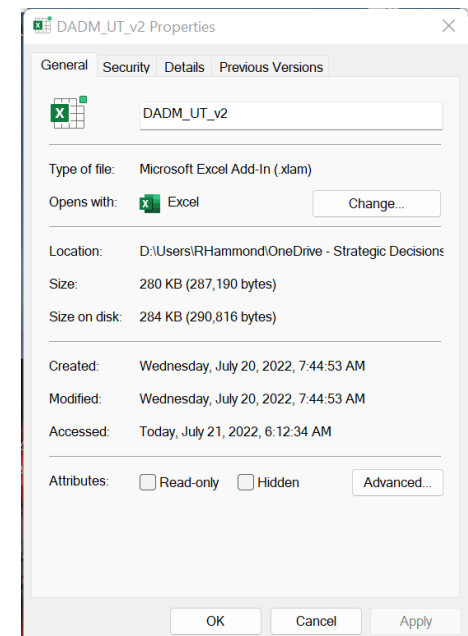
Windows might automatically block (disable) the add-in file if it is downloaded from the internet, SharePoint/Teams, or an email. If this happens, the add-in will not work unless it is unblocked with the following steps:

- Go to the folder where you saved the add-in
- Right click on the add-in file and click Properties
- Check the box beside “Unblock” at the bottom and click Apply, then click OK



If you do not see the checkbox to unblock, then you do not need to do this step.

The screenshot to the right shows how that would appear.

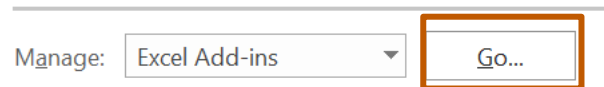




# 3. LOAD ADD-IN TO EXCEL

To load the add-in to Excel (DADM will load every time you open Excel)

- a) Open Excel and a new workbook
- b) Click “File” on the menu ribbon
- c) On the left-side menu, click “Options” near the bottom (if you don’t see it, click “More...” at the bottom of that menu)
- d) In the new window, click “Add-ins” near the bottom of the left-side menu
- e) At the bottom of this window, ensure that “Excel Add-ins” is selected in the drop-down menu and click “Go...”



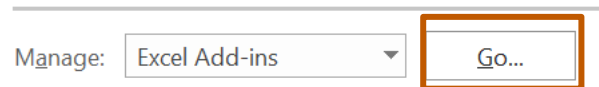
- f) In the Add-ins window, click “Browse...” and navigate to where you saved the DADM add-in file
- g) Select the add-in file and click “OK” and click “OK” again to close the add-in window



# OPTIONAL: DE-ACTIVATE THE ADD-IN

To de-activate the Excel add-in:

- a) Open Excel and a new workbook
- b) Click “File” on the menu ribbon
- c) On the left-side menu, click “Options” near the bottom (if you don’t see it, click “More...” at the bottom of that menu)
- d) In the new window, click “Add-ins” near the bottom of the left-side menu
- e) At the bottom of this window, ensure that “Excel Add-ins” is selected in the drop-down menu and click “Go...”



- f) In the Add-ins window, **uncheck** the box for the DADM add-in and click “OK”



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**4 Decision Trees**





# 1. DOWNLOAD THE ADD IN

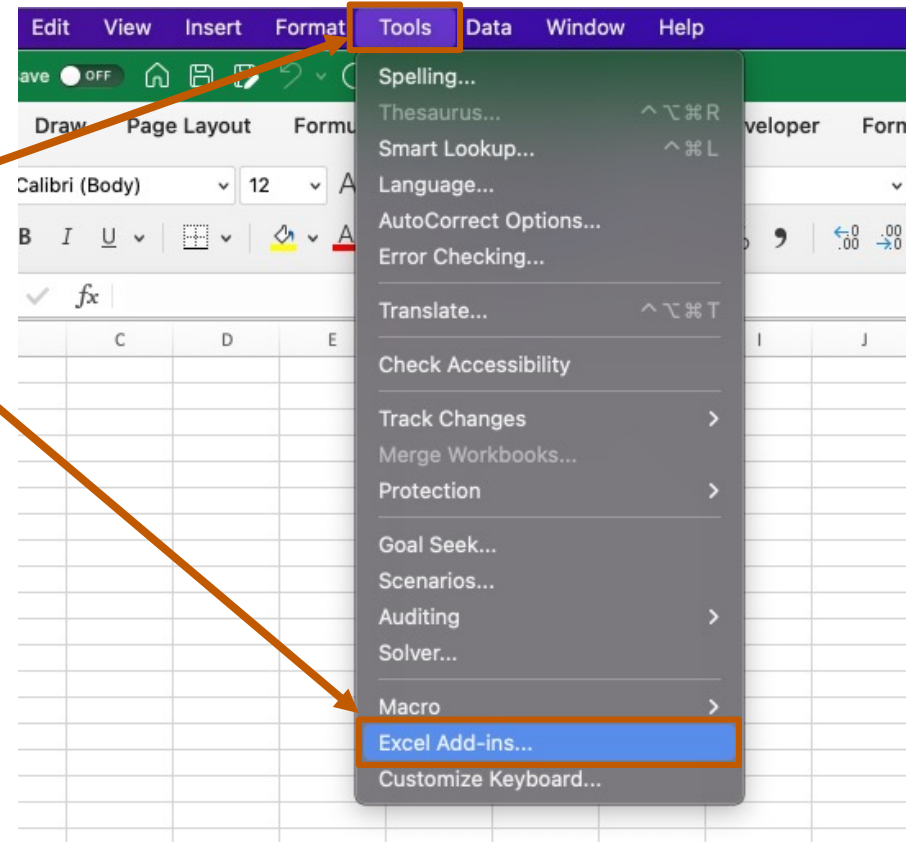
- Download and save the add-in to your computer in a folder that you can easily find.
  - Save the add-in to a folder where you can keep it indefinitely, such as the Documents folder or a folder where you keep modeling tools.
  - When you install DADM, it will load automatically each time you open Excel. After installing it, you can de-activate the add-in if you do not want it to load.



## 2. LOAD ADD-IN TO EXCEL

To load add-in to Excel (DADM will load every time you open Excel):

- Open Excel and a new workbook
- Click “Tools” on the Mac menu bar
- On the drop-down menu, click “Excel Add-ins...”
- In the new window, click “Browse...”
- Navigate to where you saved the DADM add-in file and click on it to select it
- Click “Open”
- Click “OK” in the add-ins window

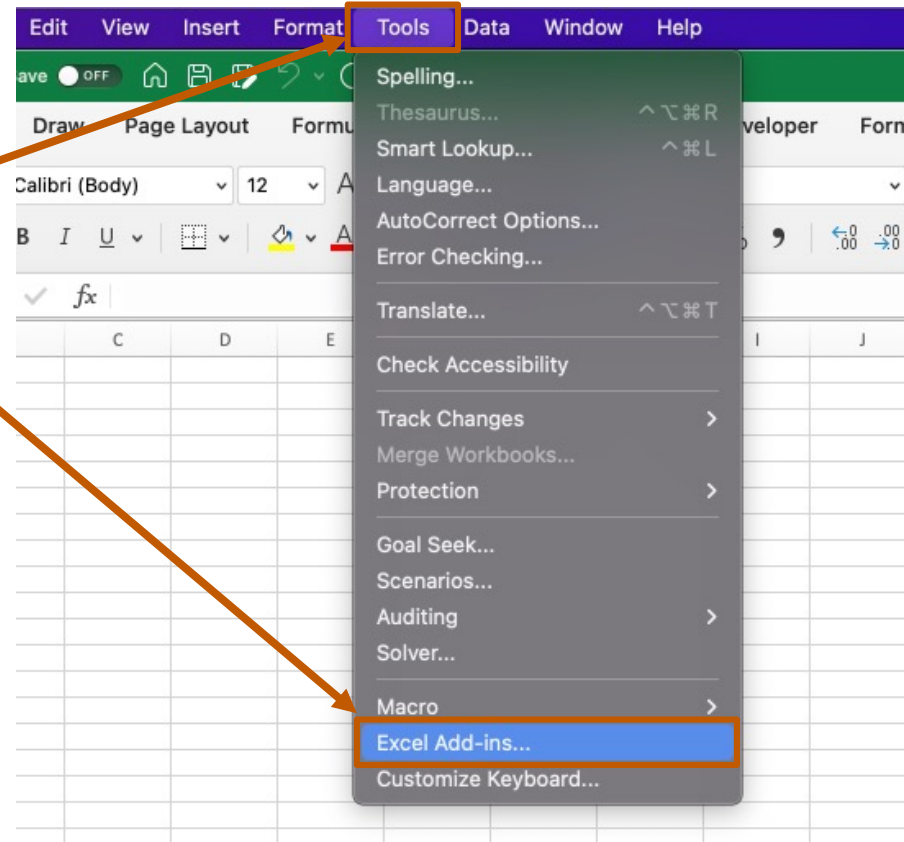




# OPTIONAL: DE-ACTIVATE THE ADD-IN

To De-activate the Excel add-in:

- Open Excel and a new workbook
- Click “Tools” on the Mac menu bar
- On the drop-down menu, click “Excel Add-ins...”
- In the new window, **uncheck** the box for DADM and click “OK”





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- 2 Installation for Mac
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# SET UP A SIMULATION MODEL

## Requirements

1. At least one probability distribution input.
2. At least one output. If there are multiple outputs, they all need to be on the same sheet.
3. Select the sheet with the output(s) when running the simulation.

## Optional

1. One (only one) decision input
2. Label(s) for output(s)
3. Label for decision



# AVAILABLE PROBABILITY DISTRIBUTIONS

Distribution	Excel Functions	Restrictions on arguments	Comments
Bernoulli	bernoulli_(p)	$0 \leq p \leq 1$	1 if a success, 0 otherwise, where success has probability p
Binomial	binomial_(n,p)	$n \geq 0$ , $0 \leq p \leq 1$	Number of successes in n independent trials, where p is the probability of success on each trial
Poisson	poisson_(mean)	mean > 0	Nonnegative integer-valued, often used for the number of events in some amount of time or place
Discrete	discrete_(values,probs)	# of values must match # of probs, and probs must sum to 1	General discrete distribution where values is any list of possible values and probs is the corresponding list of probabilities
Uniform	uniform_(min,max)	min ≤ max	Flat distribution, where any value between min and max is equally likely
Normal	normal_(mean,stdev)	stdev > 0	Famous symmetric bell-shaped distribution with given mean and standard deviation
Triangular	triangular_(min,mostlikely,max)	min ≤ mostlikely ≤ max	Distribution bounded by min and max, with peak at mostlikely value
Pert	pert_(min,mostlikely,max)	min ≤ mostlikely ≤ max	A “rounded” version of the triangular distribution
Beta	beta_(alpha1,alpha2,min,max)	alpha1 > 0, alpha2 > 0, min ≤ max	Bounded by min and max, shape determined by alpha1 and alpha2
Exponential	exponential_(mean)	mean > 0	Nonnegative “memoryless” distribution with given mean and mode at 0
Erlang	erlang_(n,beta)	n > 0, n integer, beta > 0	Right-skewed nonnegative distribution with integer shape parameter n and mean equal to n*beta
Gamma	gamma_(alpha,beta)	alpha > 0, beta > 0	Generalization of Erlang distribution where the shape parameter alpha can be any nonnegative value. Mean is alpha*beta.
Lognormal	lognorm_(mean,stdev)	mean > 0, stdev > 0	Right-skewed nonnegative distribution with given mean and standard deviation
Weibull	weibull_(alpha,beta)	alpha > 0, beta > 0	Right-skewed nonnegative distribution with shape parameter alpha and scale parameter beta. Mean is a complex function of alpha and beta.



# RUNNING A MONTE CARLO SIMULATION

1. Select the worksheet that has the random functions (your model)



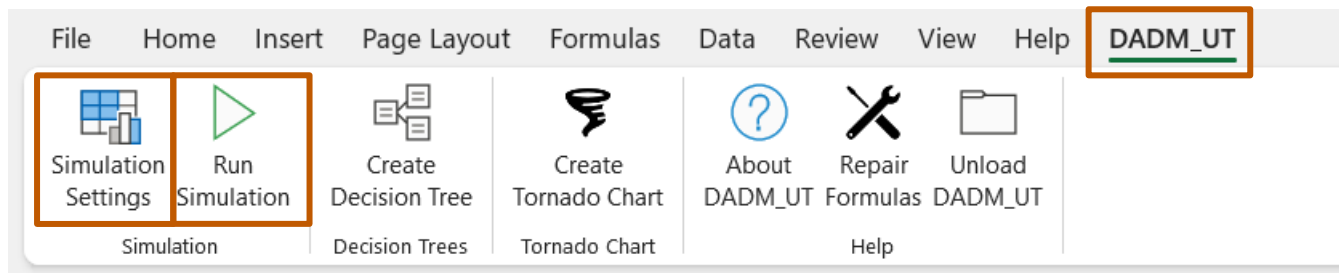
2. Click “Simulation Settings” on the DADM\_UT ribbon menu

3. Specify at least one output cell (see next page for other optional settings)

4. Click “OK” to close the Simulation Settings window



5. Click “Run Simulation” on the DADM\_UT ribbon menu to run the simulation





# MONTÉ CARLO SIMULATION MENU

Number of Monte Carlo iterations /samples to run

Calculated cells that you want as outputs from the simulation (e.g., value measures)

Specify labels of the simulation outputs

Check this box to include the sampled values of the inputs for each simulation iteration in the results

Fill in the following. Basically, you have to specify the number of replications and the outputs you want to keep track of. Optionally, you can specify a single "decision variable" you want to vary, so that you can compare output values across values of this decision variable. Note: When specifying any cells/ranges, the best method is to click individual cells and/or drag ranges while holding down the Ctrl key (Windows) or the command key (Mac). This automatically enters commas between your selections.

Number of replications

Outputs

You can specify individual output cells and/or drag ranges of related output cells (such as a range of annual profits).

Output cells and/or ranges

OutputNames (used for reports)

Specify names for the outputs. As an example, if you specified B15:C10:F10 in the previous box, you would specify only two output names: one for cell B15 and one for the range C10:F10. If you don't specify these names, generic names will be used for reports.

☒ Specify names by pointing to cells with labels that can be used for the names

Cell references

☐ Specify names by typing them (separated by commas)

Output names

Inputs

The input cells, those with random functions, are automatically detected. You can include their values in the simulation results sheet, but this is optional.

☐ Show input values in the simulation results sheet

Decision variable (optional)

☐ This model has a "decision variable" you want to vary

Specify the single cell in your model that contains the value of this decision variable.

Decision variable cell

Decision variable name (used for reports)

Specify a name for the decision variable. If you don't specify this name, a generic name will be used in reports.

☒ Specify the name by pointing to a cell with a label that can be used for the name

Cell reference

☐ Specify the name by typing it

Decision variable name

Decision variable values

Specify at least two values of the decision variable you want to compare.

☒ Specify values by pointing to cells with the values you want to compare

Cell references

☐ Specify values by typing them (separated by commas)

Decision variable values

OK Cancel

Click OK to run the simulation

Check this box to use a decision

Specify the cell for the decision input

Specify the label for the decision

Specify the choices available for the decision

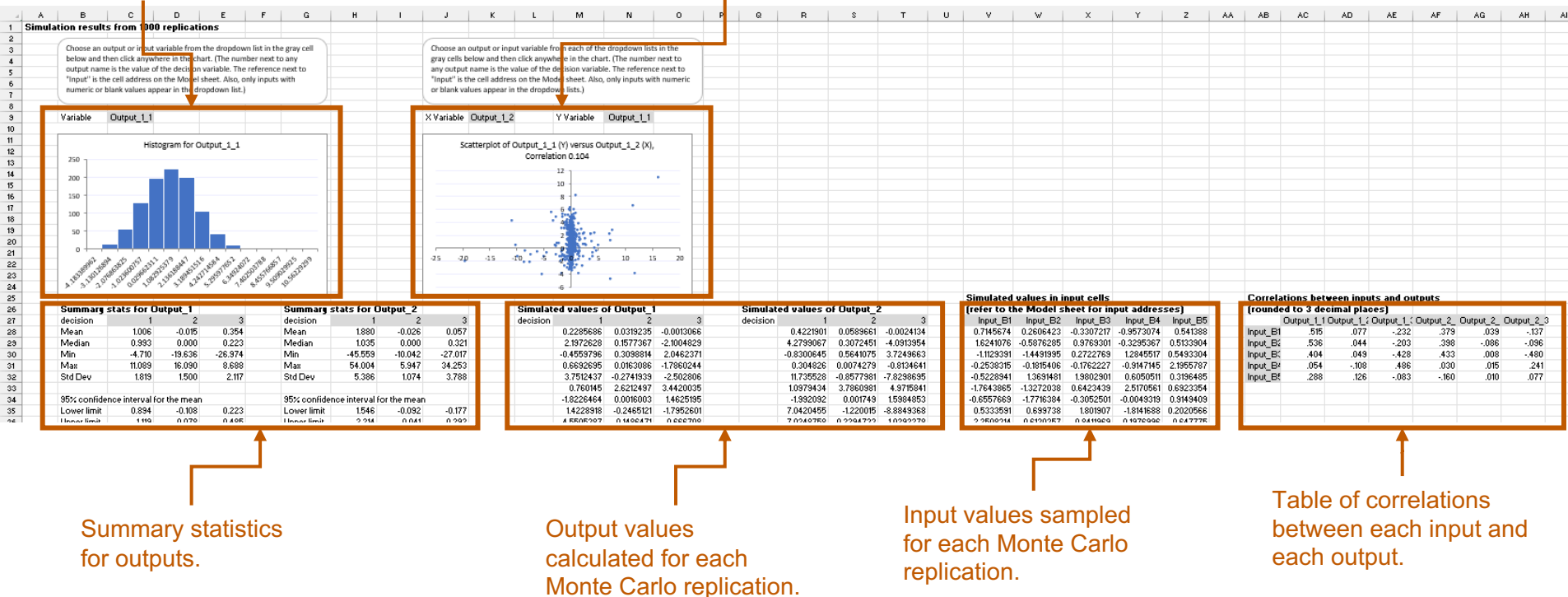




# SIMULATION RESULTS REPORT

View histogram of samples for any input distribution or output calculation.

View scatter plot between any two inputs or outputs. Gives the correlation between the selected variables.  
Compare inputs to inputs, outputs to outputs, or inputs to outputs.





# SIMULATION SUMMARY STATS

Statistics for each output are shown separately.  
There can be more than 2 outputs.

If there is a decision variable, statistics are shown for each alternative.

	A	B	C	D	E	F	G	H	I	J	K
26		Summary stats for Output_1					Summary stats for Output 2				
27		decision	1	2	3		decision	1	2	3	
28		Mean	1.006	-0.015	0.354		Mean	1.880	-0.026	0.057	
29		Median	0.993	0.000	0.223		Median	1.035	0.000	0.321	
30		Min	-4.710	-19.636	-26.974		Min	-45.559	-10.042	27.017	
31		Max	11.089	16.090	8.688		Max	54.004	5.947		
32		Std Dev	1.819	1.500	2.117		Std Dev	5.386	1.074		
33		95% confidence interval for the mean					95% confidence interval for the mean				
35		Lower limit	0.894	-0.108	0.223		Lower limit	1.546	-0.092		
36		Upper limit	1.119	0.078	0.485		Upper limit	2.214	0.041	0.292	
38		Probabilities	>=1.006	>=-0.015	>=0.354		Probabilities	>=1.88	>=-0.026	>=0.057	
39			0.498	0.611	0.458			0.356	0.615	0.541	
41		Percentiles					Percentiles				
42		5th pctlle	-1.769	-0.885	-2.290		5th pctlle	-3.555	-0.983	-5.463	
43		25th pctlle	-0.280	-0.079	-0.781		25th pctlle	-0.343	-0.120	-1.115	
44		75th pctlle	2.214	0.064	1.463		75th pctlle	3.103	0.091	1.589	
45		95th pctlle	4.004	0.900	3.544		95th pctlle	9.932	1.163	4.460	

Some common percentiles are calculated from simulation results

Calculate the probability of being above or below a value for the output. The top row is the value to calculate the probability for, and the bottom row is the probability. Enter any of >, >=, <, <= followed by a number.

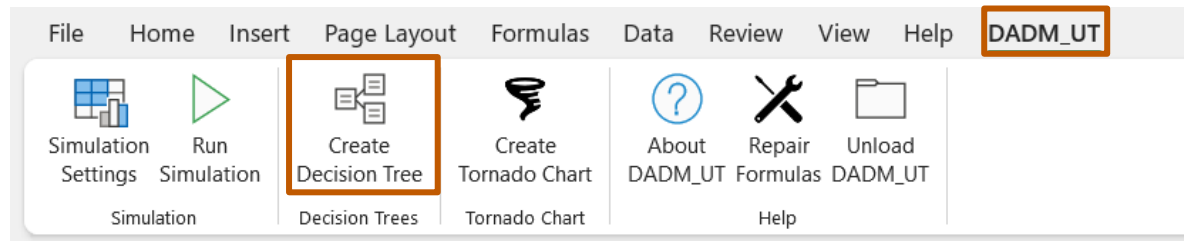


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# CREATE A DECISION TREE

1. Select or create the worksheet where you will build the tree
2. Click Create Decision Tree on the DADM\_UT ribbon menu



3. In the “New tree information” window, you can select formatting options and define whether decisions should maximize or minimize value, or just click OK to accept the default settings. **Note that these settings cannot be changed later.**

New tree information

To start a new tree, specify the starting cell for the tree, the optimization type, and a number format for monetary values on the tree.

Starting cell for tree:

Number format

Choose one of the following number formats for all of the monetary values displayed on the tree. (This doesn't include probabilities or utilities, which will be displayed as numbers with three decimals.)

Number of digits to right of decimal:

☒ Currency with 1000 separator (,) such as \$1,234.56

☐ Number with 1000 separator (,) such as 1,234.56

☐ Currency with no 1000 separator (,) such as \$1234.56

☐ Number with no 1000 separator (,) such as 1234.56

Optimization type

☒ Maximize expected monetary value

☐ Minimize expected monetary value

☐ Maximize expected utility

Risk tolerance R for exponential utility:

OK Cancel



# BUILD THE DECISION TREE

1. The “Information about initial node” window opens for the first node when the tree is created, and also whenever you create a new node.

2. Select the nodes type, enter a name for it, and enter the number of branches.

**Once a node is created, the number of branches it has cannot be changed.** But all other settings in this window can be changed later. (You can delete and a node and re-create it to change the number of branches, but this will also delete any nodes that come after it in the tree)

Information about initial node

Specify the type of initial node for the tree, a descriptive label for this node, the number of branches from this node, and descriptive labels on these branches. Optionally, you can supply the values (payoffs/costs) on the branches and/or the probabilities on probability branches. If you don't supply any values, they will default to 0. If you don't supply any probabilities, they will default to equal probabilities. Of course, you can always change these values and probabilities later on in the tree.

OK Cancel

**Selected node**

☒ Decision  
☐ Probability

Descriptive label

Number of branches

**Descriptive labels on branches**

☒ Specify the labels by pointing to cells that contain the labels  
Cell references

☐ Specify the labels by typing them (separated by commas)  
Descriptive labels

**Payoffs/costs on branches**

☒ Specify values by pointing to cells that contain the values (any blank cell results in a value of 0)  
Cell references

☐ Specify values by typing them (separated by commas)  
Payoffs/costs

**Probabilities on branches**

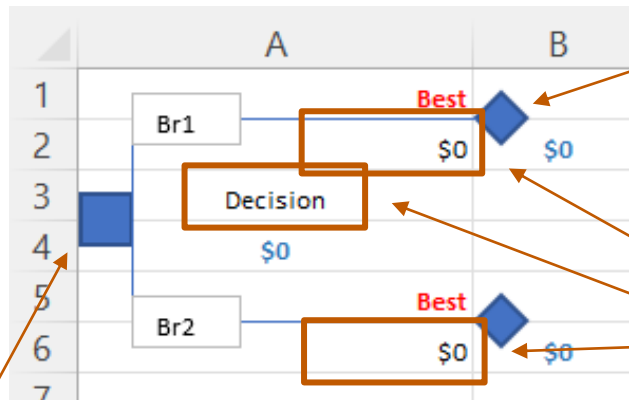
☒ Specify values by pointing to cells that contain the values  
Cell references

☐ Specify values by typing them (separated by commas)  
Probabilities

3. Enter labels, payoffs/cost, and (if applicable) probabilities for each branch. These can be changed later in the Excel worksheet.



# EDITING A TREE



Click a node for a menu of node actions

Click on a diamond endpoint node to add a node to the tree.

Node Actions

Choose one of the following actions to perform on the selected node.

☒ Expand the tree from this node

☐ Copy the subtree starting from this node

☐ Paste the copied subtree to this node

☐ Delete the subtree starting from this node

☐ Change node type (toggle decision or probability)

OK Cancel

Click on the cell for a node label or the branch payoffs or probabilities to directly edit them.

Node Actions

Choose one of the following actions to perform on the selected node.

☒ Expand the tree from this node

☐ Copy the subtree starting from this node

☐ Paste the copied subtree to this node

☐ Delete the subtree starting from this node

☐ Change node type (toggle decision or probability)

OK Cancel

A subtree can be copied and pasted to any endpoint on the tree. Subtrees cannot be copied from one Excel sheet to another.

Delete a subtree. This cannot be undone.

Change a decision node to an uncertainty node or an uncertainty node to a decision node.