1. Basic Form
    Flowcharts are commonly used to diagram program logic. An example flowchart is shown in Figure 1. This chart is for a program that will insure the output is an even number. If an odd number is read it is increased by one; an even number is left alone.   This type of chart is helpful for planning or explaining the logic details of a program.   In addition flow charts can also be used to document other sequential plans, e.g., a business process.

    This example uses four standard flow chart elements: 1) Start/end, 2) Import/export, 3) executable statement and 4) conditional (branch). These standard elements are listed on the right of Figure 1.   Flowcharts for this course can be constructed from these four elements.

Figure 1: Shows an example flowchart on the left and identifies standard elements on the right. This figure & example are adapted from Peter So[1]

2. Constructing a Conditional Flowchart in Visio
    Flowcharts can easily be drawing using MS Visio (Figure 1 was drawn this way).   The following three steps are adapted from a Microsoft beginners guide to Visio.[2]

    Exercise: Use the steps listed below to reproduce the flowchart in Figure 1.

How to check if a number is even:
- The rem(a, b) function determines the remainder of the division a/b
- therefore rem(x,2) == 0 will yield a logical 1 if x is even and a logical 0 if it is odd.

Step 1: Choose and open a template
1. Start Visio.
2. Click the **Flowchart** category button (this initial screen sometimes varies).
3. Click **Basic Flowchart**, and then click **Create**.

Each template includes shapes related to the type of drawing, in collections called stencils. Stencils are in the **Shapes** window beside the drawing page. For example, one of the stencils that opens with the **Basic Flowchart** template is **Basic Flowchart Shapes**.

Before starting drawing set up the overall diagram theme (style). To do this go to the Design tab and select one of the simple themes. Generally the dark text on a light background reproduce better, are easier to read and use less printer ink. The theme identified by the icon at the beginning of this paragraph is recommended.

Step 2: Drag and connect shapes
To create your diagram, drag shapes from the stencil onto the blank page and connect them to one another. There are several ways to connect shapes, but for now use AutoConnect. For example, just a few clicks connects a flowchart Start/End shape to a new Process shape.
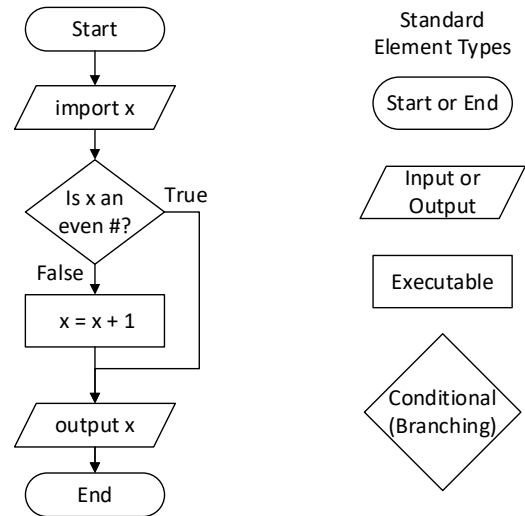
1. Drag the **Start/End** shape from the **Basic Flowchart Shapes** stencil onto the drawing page, and then release the mouse button.

2. Hold the pointer over the shape so that the blue AutoConnect arrows show (see Figure 2).

3. Move your pointer on top of the blue arrow that points toward where you want to place the second shape.   A mini toolbar appears that contains shapes from the top of the stencil.

4. Click the square **Process** shape.   The **Process** shape is added to the diagram, automatically connected to the **Start/End** shape.
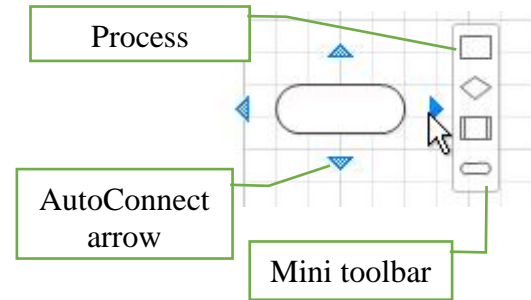

Figure 2: Example of a Visio shape in the drawing area. Hovering over a blue AutoConect arrow brings up a mini-toolbar

If the shape you want to add isn't on the mini toolbar, you can drag the shape you want from the **Shapes** window and drop it on a blue arrow. The new shape is connected to the first shape as if you had clicked it on the mini toolbar.

Use the AutoConnect arrows also to connect two shapes already in your drawing. Drag an AutoConnect arrow from one shape and drop it on another shape. You get an arrow from the first shape to the second.

⌐Connector   You can also connect two shapes already on the drawing using the connector tool that is on the Tools panel of the Home tab (the icon at the beginning of this paragraph).   Click on this icon then click on the edge of the first shape, hold down the left mouse button and drag the mouse to the second shape you wish to connect, then release the mouse button. Click on the Pointer Tool above the Connector Tool to return the mouse to usual functioning.

Step 3: Add text to shape

1. Click the shape and start typing. You don't need to double-click to add text to a shape; when you type, text is added to whichever shape is selected.
2. When you finish typing, click on a blank area of the drawing page or press ESC.

You can add text to almost any object – even connectors – by selecting it and typing.

The default text is 8 point, this is often too small. Consider increasing it to 10 or 11 point.

The text for the lines can be moved by clicking on the on the line. Once this is done handles (small dots) will appear on the line. The yellow dot is for the text and can be dragged to a new location. The other handles will rearrange the path of the line.

Footnotes

1   Peter So, course materials for 2.003J / 1.053J Dynamics and Control I, Fall 2007. MIT OpenCourseWare (http://ocw.mit.edu), Massachusetts Institute of Technology. Accessed February 2015.
2   MicroSoft, A beginner's guide to Visio, MicroSoft Office Support, 2015, https://support.office.com/en-in/article/A-beginners-guide-to-Visio-bc1605de-d9f3-4c3a-970c-19876386047c, accessed February 2015.