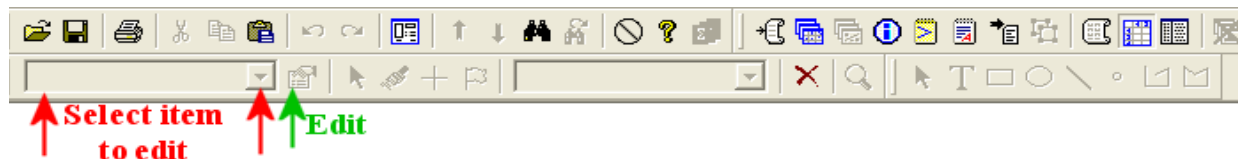


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LESSON 3 - INTRODUCTION TO GRAPHING

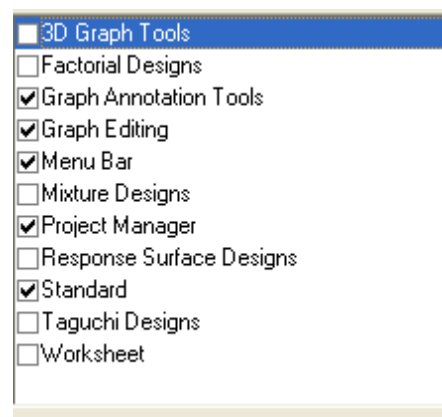
In this lesson you will learn to use Minitab to create frequency histograms and frequency polygons. To start, if your tool bars do not look like the figure below,



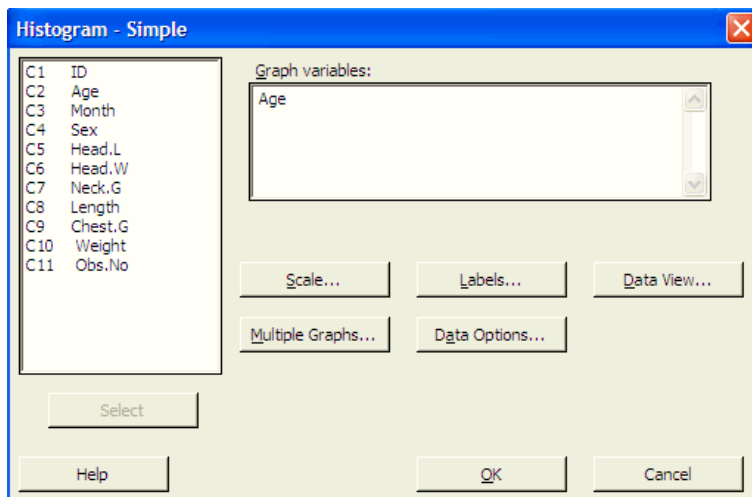
do the following to get the tools where you need them. Click on Tools > Customize then click on the Toolbars tab. In the dialog box that opens, check and uncheck as needed so that it matches the figure to the right. For this lesson we will be using the "Select item to edit" menu and the "Edit" tool indicated by arrows in the figure above.

GRAPH WINDOWS

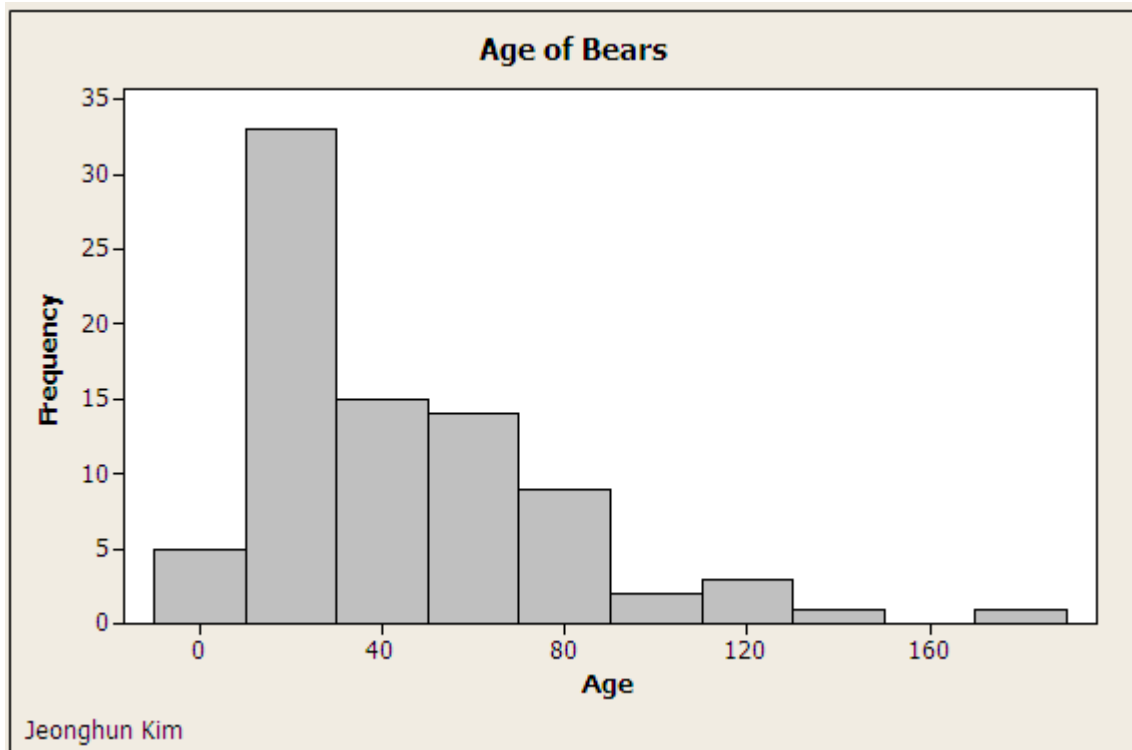
Once data has been entered into the data window, graphs may be created using the Graph menu. If you have a worksheet open, close it and retrieve the worksheet



Bears.MTW from
K:\minitab15\MINITAB\MiniTab.
Clear everything below the date/time stamp then type your name, Lesson 3 and Example on separate lines below the time/date stamp. You will create a frequency histogram of the variable Age. Click on Graph > Histogram . Click "OK" on the first dialog box that opens, and a second dialog box will appear (shown on the right). The cursor should be in the "Graph variables:" box. Click on C2 Age in the box on the left. Click on the



"Select" button and your dialog box should look as it does above. Now click on "Labels" and a new dialog box with several blank boxes will appear. Type "Age of Bears" into the box called "Title:" and your name into the box called "Footnote 1:". Now click on "OK" to close the Labels dialog box then "OK" on the histogram dialog box to create the graph. The frequency histogram appears in its own graph window. It is shown at the top of the next page.



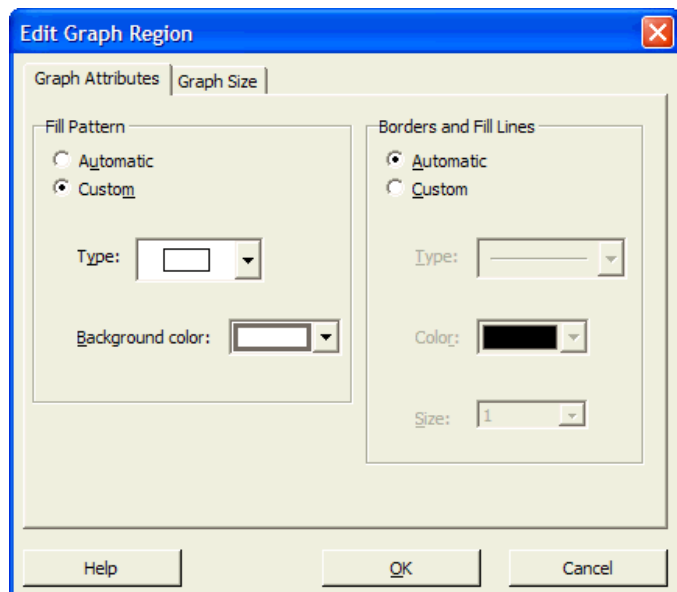
PRINTING A GRAPH

Make the graph you wish to print the active window. Click on **File > Print Graph** or click on the printer icon on the tool bar. The printer orientation should be Landscape, (Minitab will usually automatically set to Landscape for graphs, but check!) then print the graph.

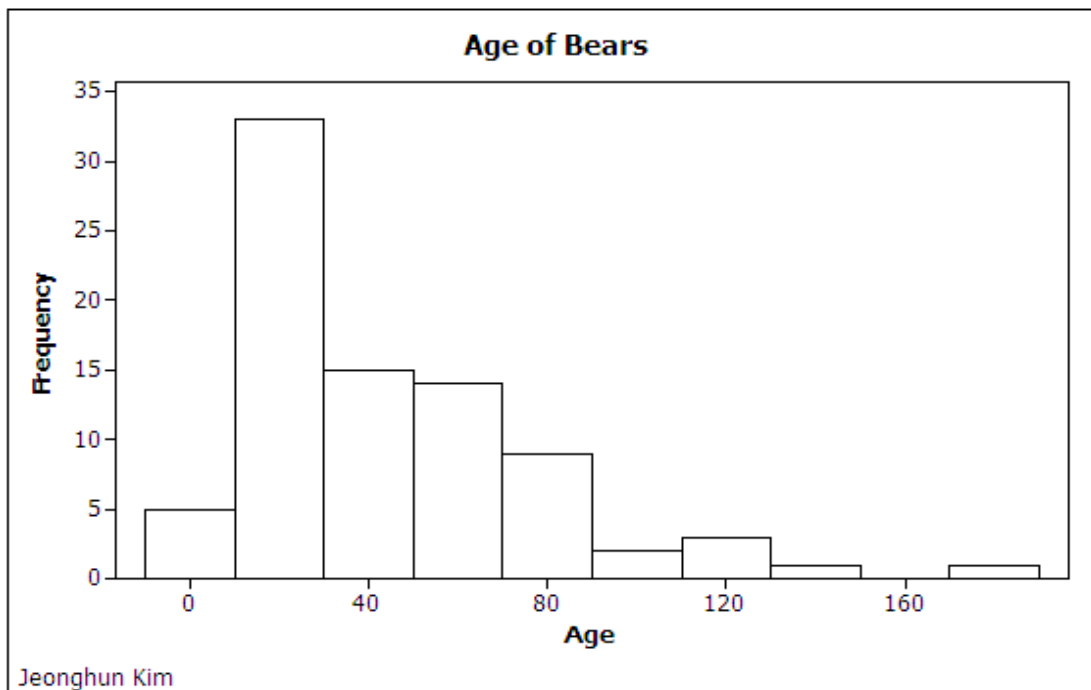
EDITING A GRAPH

It is frequently desirable to make changes to the appearance of a graph. For example, if the graph is to be printed on a black and white printer, it is better to make the graph all black and white before printing it. For this graph we want to make the tan background white.

Pull down the "Select item to edit" menu and select "Graph Region," then click on the "Edit" tool. (See the image at the top of page 12.) You will get the dialog box shown on the right. (You can also get this dialog box by double clicking anywhere in the tan area of the graph.) Now click on the "Custom" button in the

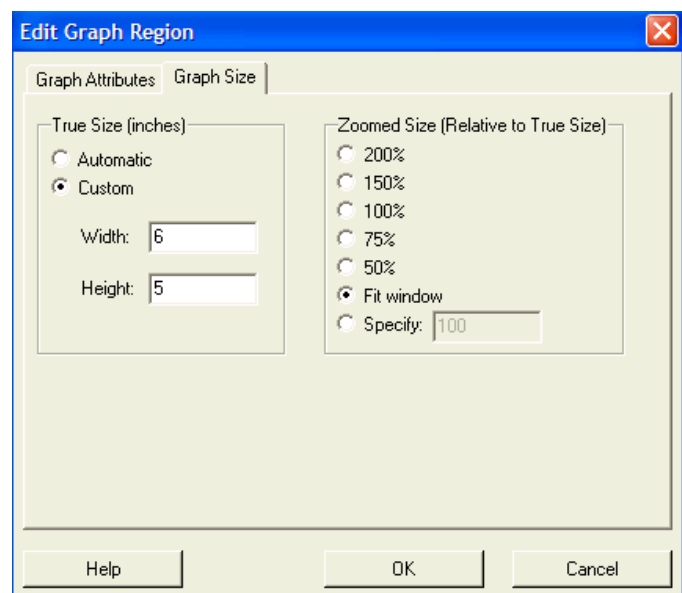


"Fill Pattern" area, then choose white from the "Background color" menu. When you click "OK" the tan will turn white. Choose "<None>" as the item to edit. Let's repeat the process for "Bars". Pull down the "Select item to edit" menu and select "Bars," then click on the "Edit" tool. Now click on the "Custom" button in the "Fill Pattern" area, then choose white from the "Background color" menu. Choose "<None>" as the item to edit. You can see the result below.

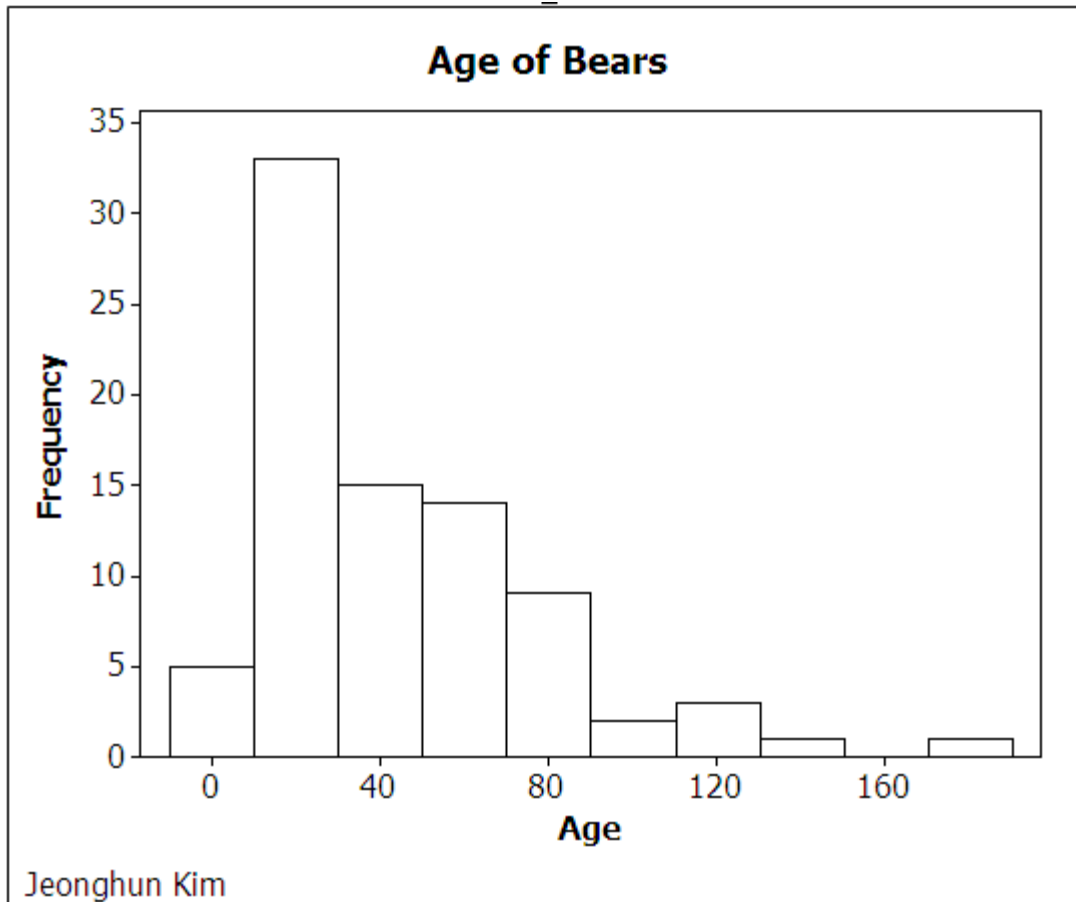


In this course we will make all of our graphs black and white, but if you are doing work for other courses and have a color printer available, you may want to experiment with more colorful graphs.

Now we would like to make some other changes to graph above. For example, we can make the graph conform to the 3/4 rule (right now the y-axis is only about half the x-axis). This can be done in either of two ways. After choosing "Edit Graph Region" or the "Edit Figure Region" dialog box, click on the Graph Size tab. Click the "Custom" button in the "True Size" area of the new dialog box that opens and change the "Height:" to 5. The dialog box should now look like the figure on the right. When you



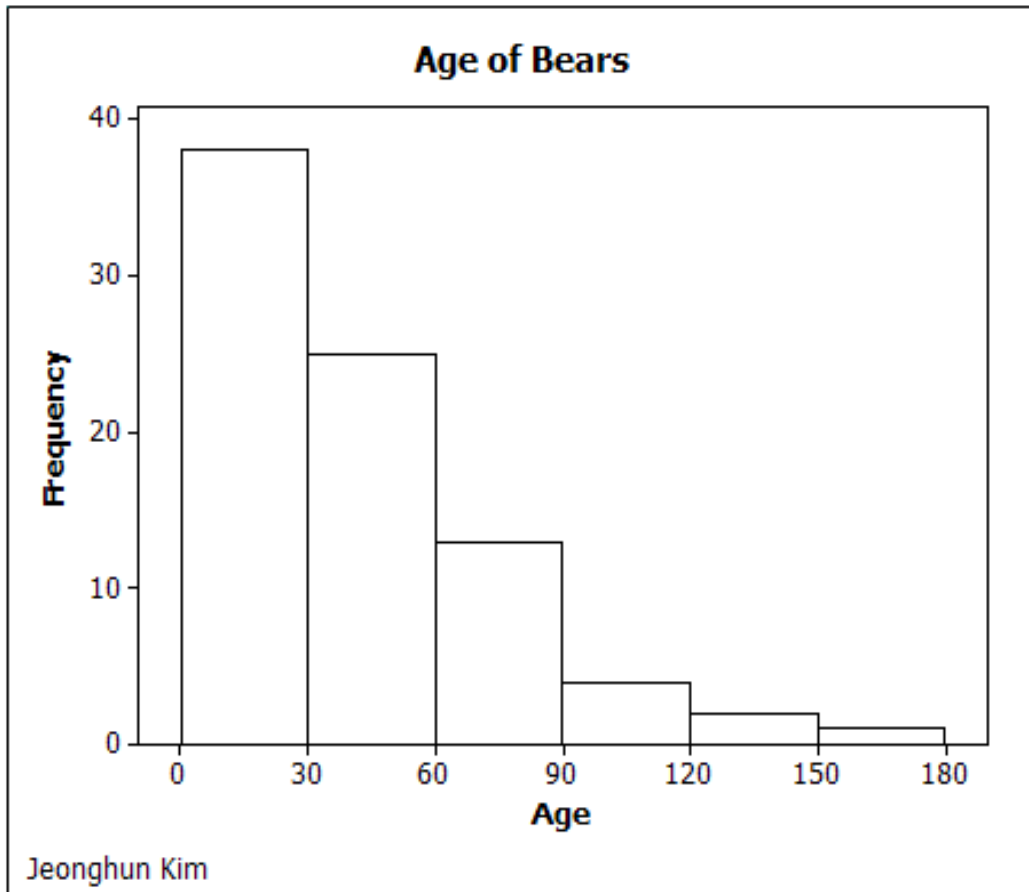
click "OK", the graph window will change proportions and the vertical axis will now be about 3/4 of the horizontal axis.



An alternative way to change the proportions of the axes without changing the proportions of the entire graph window is to select "Data Region" as the item to edit. This will cause the data area to be framed with a rectangle that has "handles" at the corners and in the middle of the sides. You can now change the proportions of the data area, and therefore of the axes, by dragging these handles with the mouse.

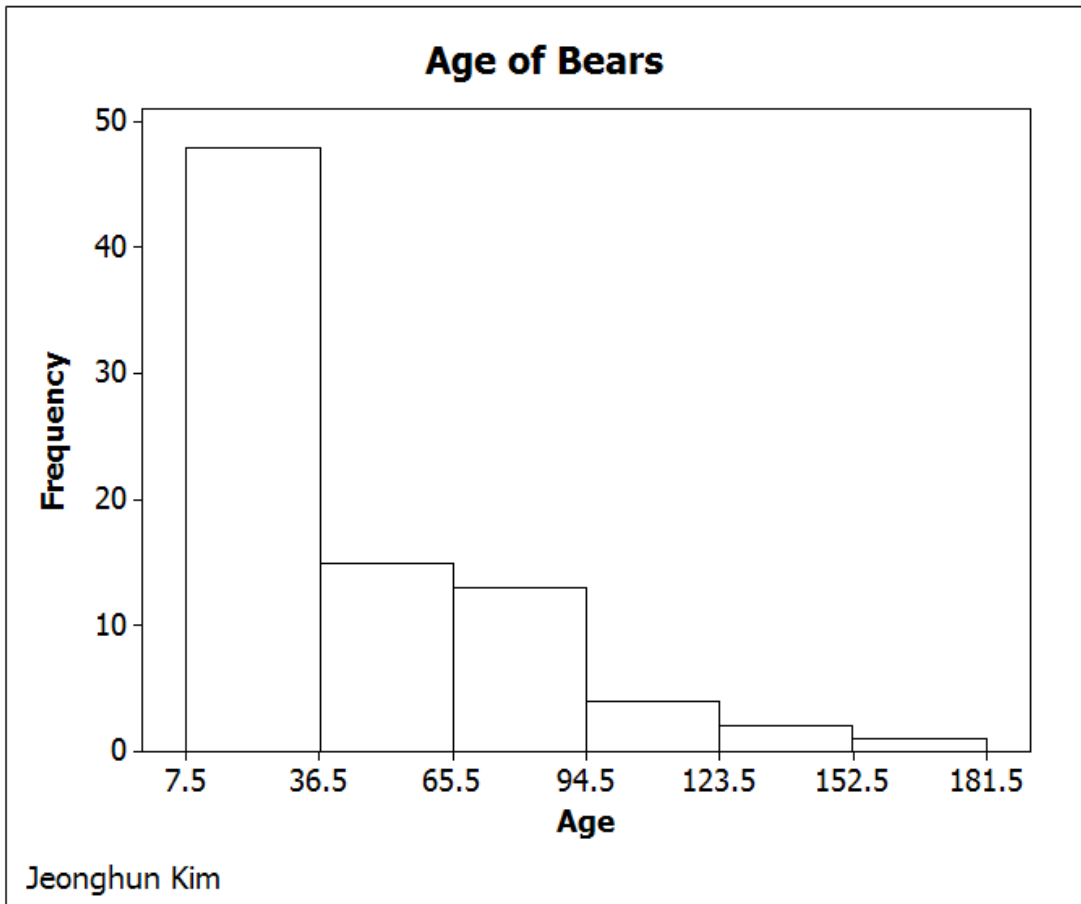
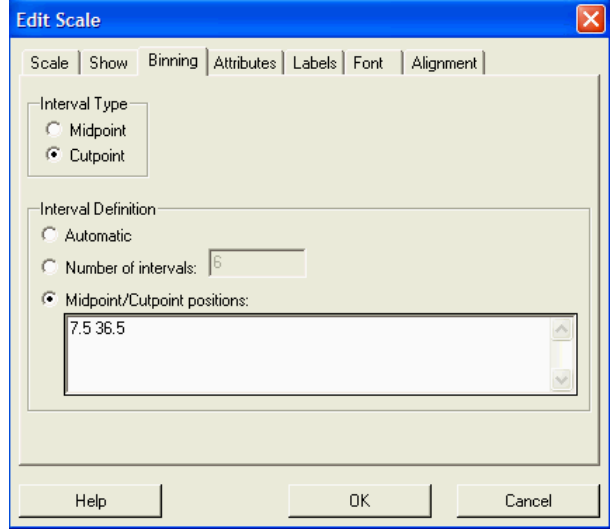
CONTROLLING HISTOGRAMS

You can control the appearance of a histogram in Minitab just as you do with one constructed by hand. As an example, let's construct a histogram with 6 classes of the age of bears. To get the right number of classes, get into the "X Scale" editing dialog box and click on the "Binning" tab. For "Interval Type" click on "Cut point" and for "Interval Definition" click on "Number of intervals:" and change it to 6. Now click "OK" and you should have the graph shown in the next page.



This graph still does not conform to our standards because the class width and class boundaries were not calculated according to our rules. To get what we want, we must define the class boundaries (what Minitab calls "cut points") ourselves. The first thing we need is the largest and smallest data values. We could search the data, but Minitab gives us an easier way. Click Stats > Basic Statistics > Display Descriptive Statistics. Select C2 Age into the "Variables:" box. Click on "Statistics". In the new dialog box that opens, click on the check boxes as needed so that only Maximum and Minimum are checked. Now click "OK" and "OK". In the session window you will see that the minimum is 8 and the maximum is 177. Our formula for the class width with 6 classes is $(177 - 8)/6 = 28.16\dots$, which rounds up to 29. (Remember, always round up unless the division yields an integer.) If we choose 8 as the lowest class limit, then the lowest class boundary will be 7.5, and the rest will be 36.5, 65.5, 94.5, 123.5, 152.5 and 181.5. (If you don't have a calculator handy to do the required computations, you can get one by clicking Tools > Microsoft Calculator.) Now get back into the "Binning" dialog box, click on "Midpoint/Cutpoint positions:", delete the existing cutpoints then enter the **first 2** class boundaries listed above into the box (separate with spaces, not commas) and click "OK".

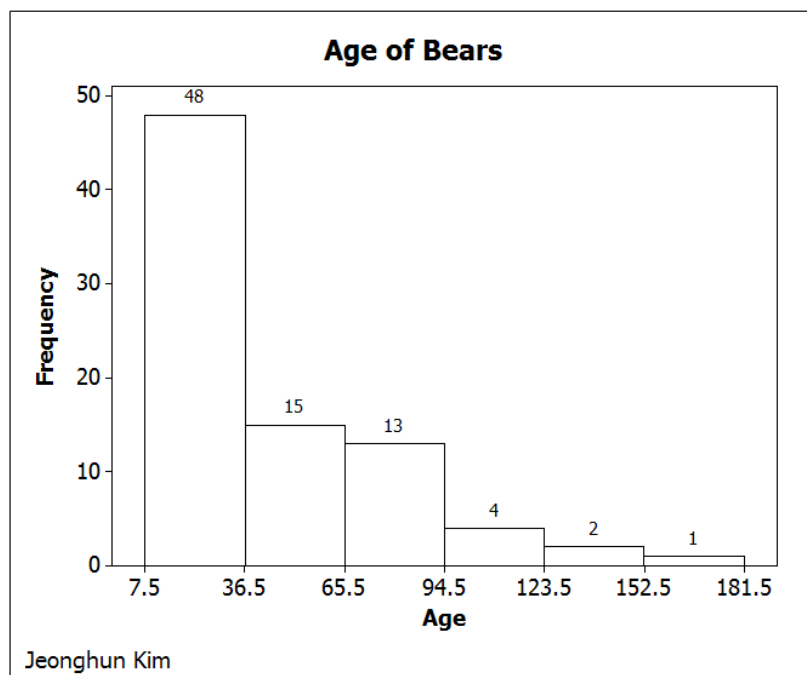
The dialog box should now look like the figure on the right. Notice that Minitab fills in the rest of the boundary values at equal intervals. You should now see the graph shown below, which satisfies all of our rules.



If you want a relative frequency histogram, select "Y Scale" as the item to edit, click the "Edit" tool, click on the "Type" tab, choose "Percent" and click "OK". Change the graph to relative frequency, then back to frequency.

FINDING GROUPED FREQUENCIES

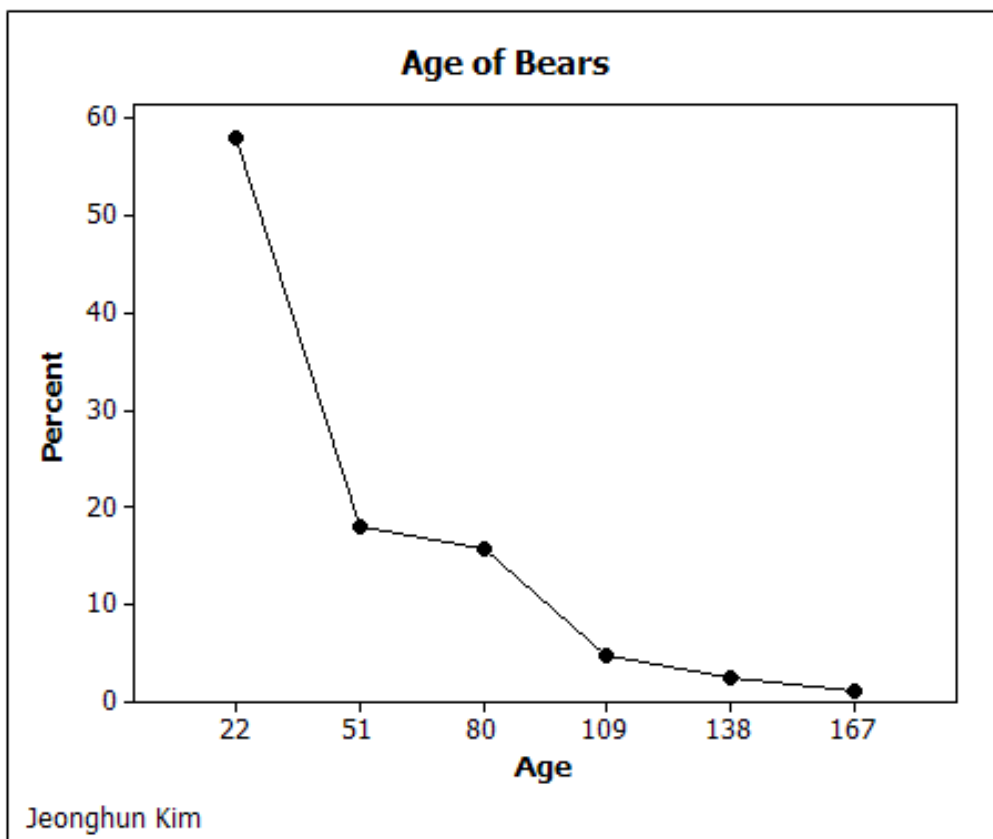
As promised in Lesson 2, we will now see how to find the frequencies for a grouped frequency distribution. Now click on Editor > Add > Data Labels > "OK". After selecting "<None>" as the item to edit, you will be able to read the frequencies for the groups at the top of the columns of the histogram like the graph below.



POLYGONS

Now let us make a relative frequency polygon with 6 intervals of the age of the bears. Click Graph > Histogram > "OK". After selecting the variable to be graphed and entering a title and your name, click on "Data View", uncheck "Bars" and check "Symbols". Now click on the "Smoother" tab, choose "Lowess" and set "Degree of smoothing:" to zero, then click "OK" and "OK". Select the X Scale as the item to edit, click on the Edit tool and click on the Binning tab. Leave the "Interval Type" as "Midpoint", and in the "Interval Definition" area click on "Midpoint/Cutpoint Positions:". If we start with 8 as the first class limit, the first two midpoints in this case will be 22 and 51, so delete the existing midpoints and enter these values in the box, and the rest will be computed by Minitab. Now select the "Y Scale" as the item to edit, click the edit tool, click the "Type" tab, and select "Percent". After forcing the 3/4 rule and making

everything black and white, the graph will look like the figure below.



SAVING A GRAPH

There are several ways to save a graph depending on what you want to do with it later. If you wish to incorporate a graph into a report you are writing in a word processor such as Microsoft Word, you may send a copy of the graph to the clipboard and then paste it into your document.

Assuming that the graph you wish to save is the active graph window, click on Edit > Copy Graph. A bitmap of the graph is sent to the clipboard on Windows. Go to your word processor, set the cursor to the desired location, then click on "Paste" from the Edit menu. The graph above was transferred to this document by this method.

Graphs can also be saved to disk for later use by clicking File > Save Graph As... and following the normal steps for saving any document. The default type is .mgf (Minitab graph), but if you plan to use the graph on a Web page or other document, you will want to choose a different type from the "Save as type:" menu.

MINITAB ASSIGNMENT 3

See instructions on page 8 of Lesson 1.

1. The data in K:\minitab15\MINITAB\MiniTab\Grades.MTW consists of verbal and math SAT scores and corresponding GPA's.

(a) Create a relative frequency histogram with 7 classes of the verbal SAT scores. Be sure to label the columns.

(b) Create a frequency polygon with 7 classes of the verbal SAT scores.

2. Create a frequency histogram with 6 classes satisfying following conditions:

- i. use the data in Problem 29 on page 52.
- ii. enter the data values in C1 and name C1 as "Sales".
- iii. start with the value 1000 as the first lower class limit.
- iv. name the title "July Sales"

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