

# What Makes A Good Graph?

- What must be included on a graph?
- What makes a graph meaningless?

# What makes a graph *good*???

- A graph is *good* if it is comprehensible
  - the information presented in the graph is clear and easy to understand
  - the graph can stand-alone without additional information or explanation

# What makes a graph *good*???

- When making a graph,
  - make sure that all important information has been provided in the graph
  - treat as if the graph were to be published in a journal, magazine or newspaper
    - for example, the *Boston Globe*

# How does one make a graph clear and easy to understand???

- The graph must include
  - a meaningful title
  - a horizontal axis
    - with a meaningful/appropriate scale
      - ▣ scale must have
        - ◆ reasonably equally spread tick marks
        - ◆ numbers/labels for tick marks
  - a meaningful horizontal axis label
    - include the units

# How does one make a graph clear and easy to understand???

- The graph must include
  - a vertical axis
    - with a meaningful/appropriate scale
      - ▣ scale must have
        - ◆ reasonably equally spread tick marks
        - ◆ numbers/labels for tick marks
  - a meaningful vertical axis label
    - include the units, if any

# How does one make a graph clear and easy to understand???

- The graph must include
  - information being presented in the body of the graph must be clear and easy to read/understand
    - not messy
    - carefully drawn to scale
      - ▣ drawn to fit
        - ◆ horizontal scale
        - ◆ vertical scale

# What makes a title meaningful???

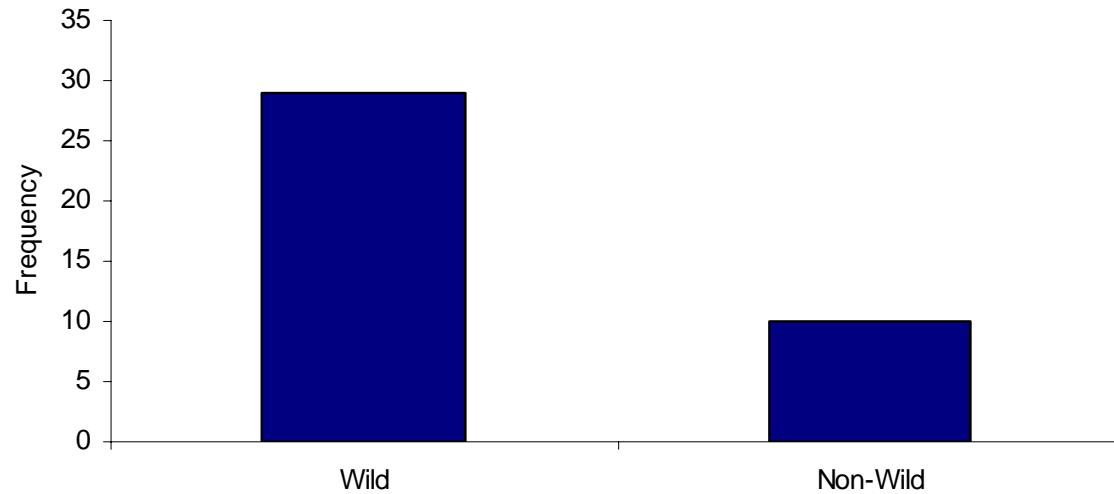
- The inclusion of
  - the context
  - the inclusion of the variable(s)
- *Optional:* the inclusion of the type of graph for those who do not know

# What makes an axis label meaningful???

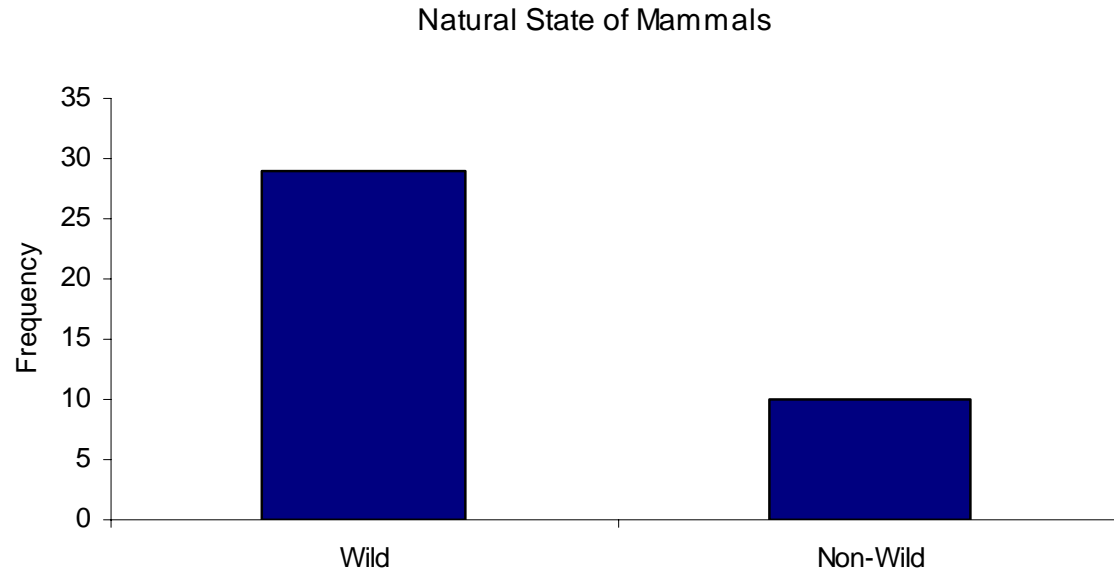
- The axis label should be
  - the name of the variable
  - must include the units for the variable
- The axis labels tells the reader *what* was being measured and the units tell the reader *how* the variable (the quantity) was measured.

# Is this graph good???

Natural State of Mammals



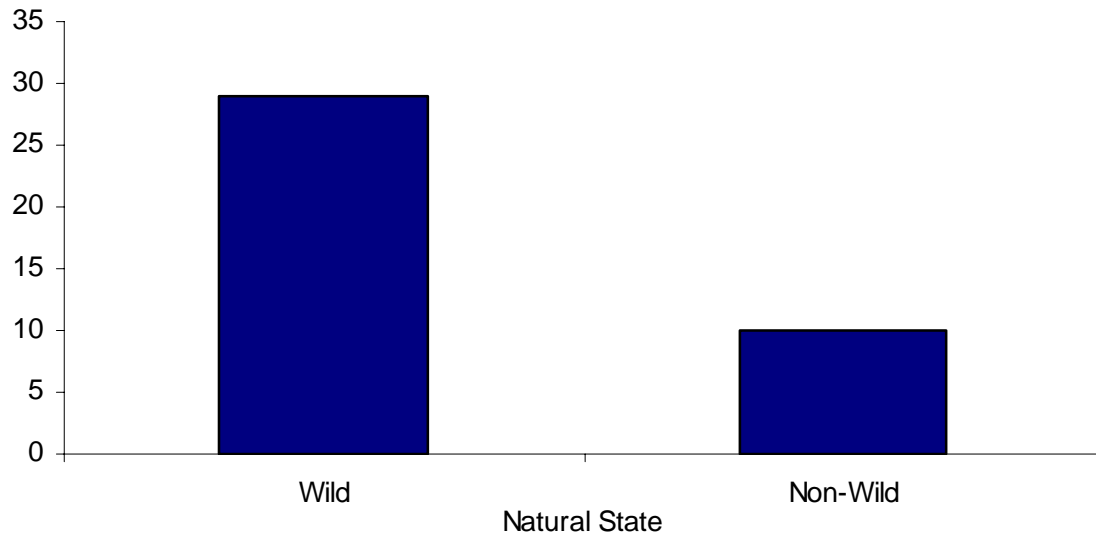
# Is this graph good???



- This is not a good graph because the title is meaningless (Is this graph for *all* mammals?) and the horizontal axis is not labeled with the name of the variable (What is the variable being examined?).

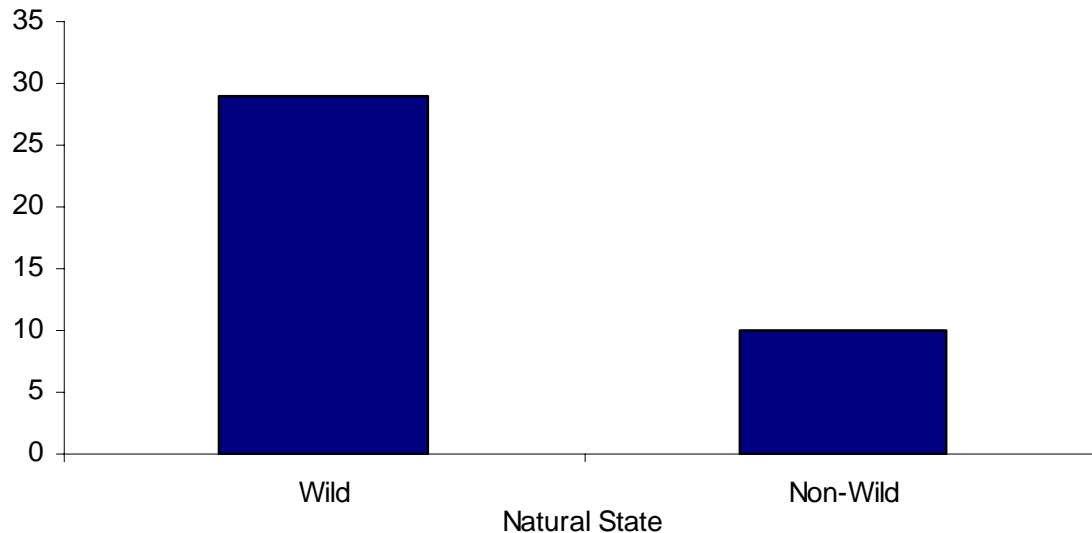
# Is this graph good???

Frequency Bar Graph



# Is this graph good???

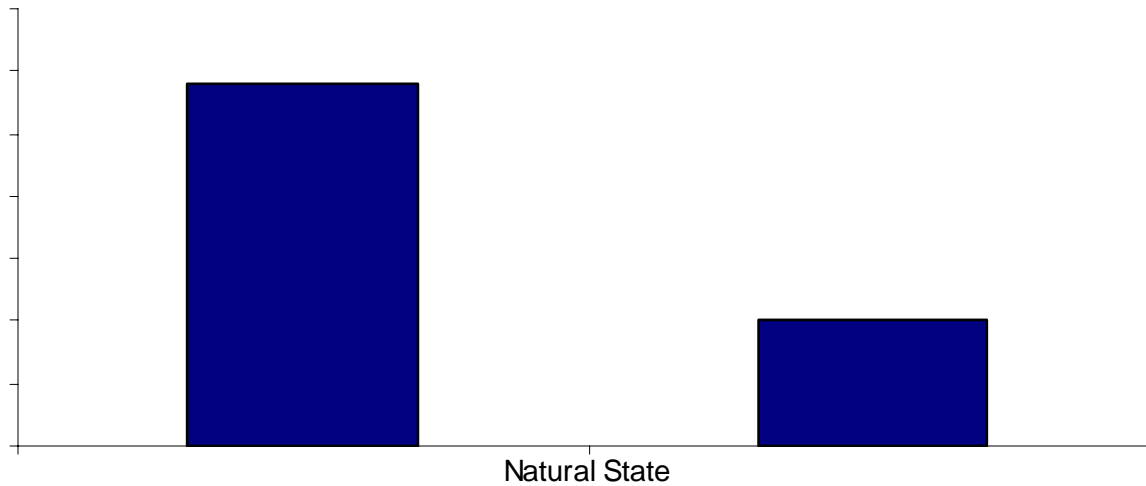
Frequency Bar Graph



- This is not a good graph because the title is meaningless and the vertical axis is not labeled so that we will know what is being measured on this axis; if this is a frequency bar graph then the vertical axis label would be "Frequency".

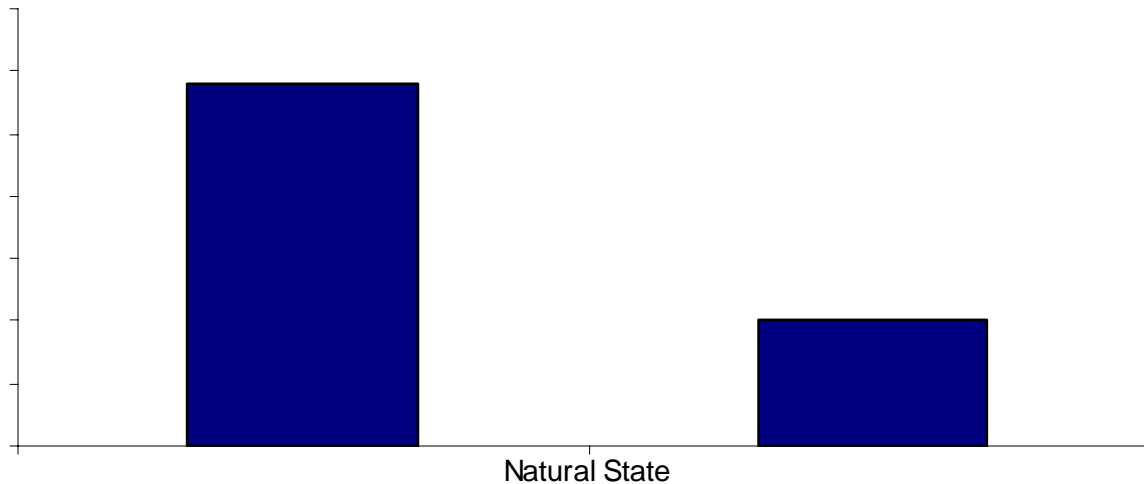
# Is this graph good???

Frequency Bar Graph



# Is this graph good???

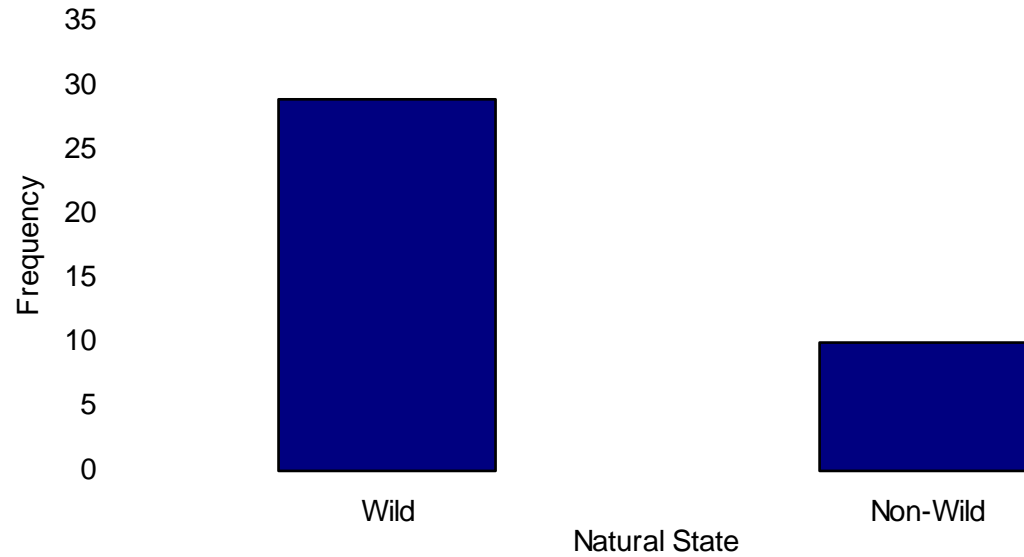
Frequency Bar Graph



- This is not a good graph because the title is meaningless, the vertical axis has neither a scale (How high are the bars?) nor an axis label (What is being measured?), and the bars for the bar graph have no labels (What do these bars represent?) below the horizontal axis.

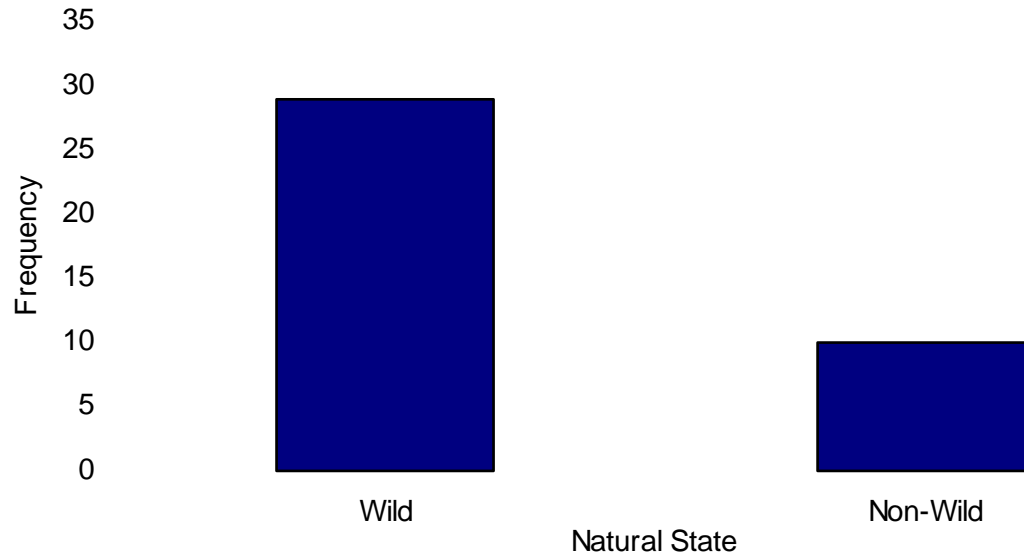
# Is this graph good???

Frequency Bar Graph for the Natural State of a Sample of Mammals



# Is this graph good???

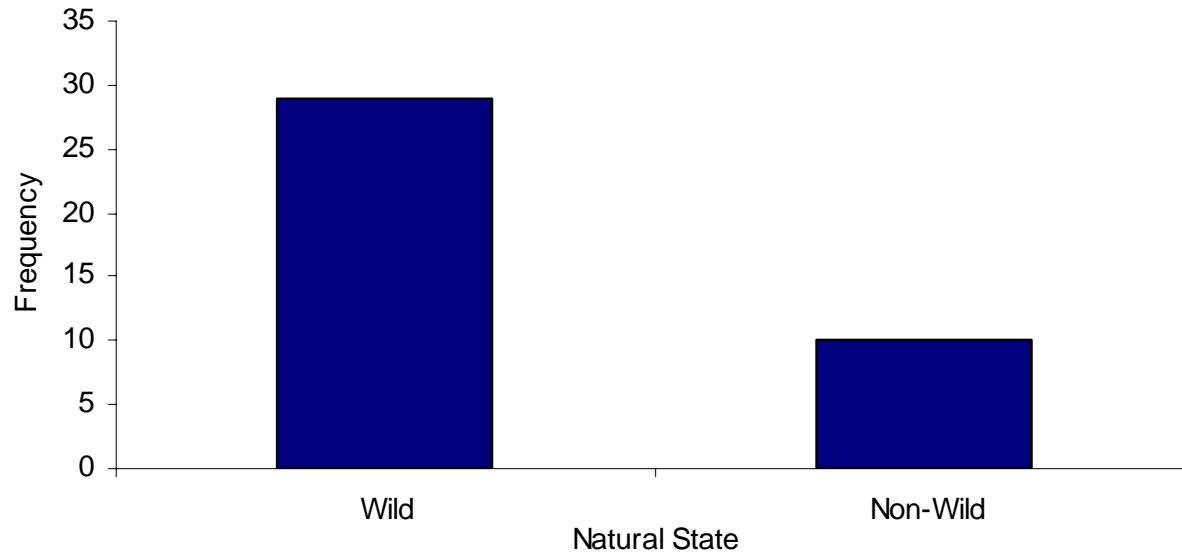
Frequency Bar Graph for the Natural State of a Sample of Mammals



- This is not a good graph because there is neither a horizontal axis nor a vertical axis and there are no tick marks (How “high” is each number? What is the height of each bar?) for the numbers along the missing vertical axis.

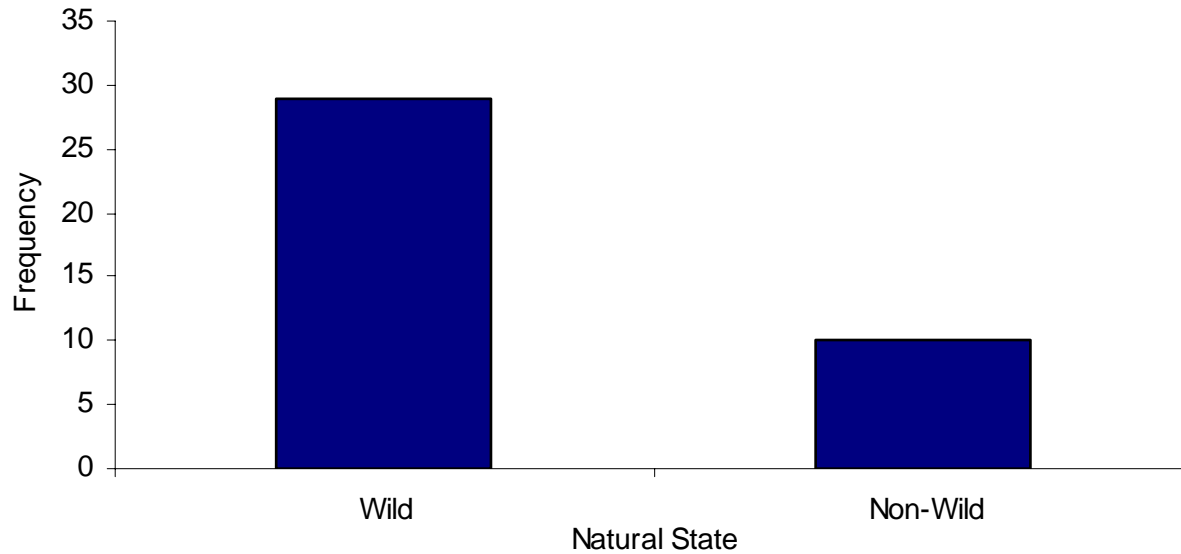
# This graph good!

Frequency Bar Graph for the Natural State of a Sample of Mammals



# This graph good!

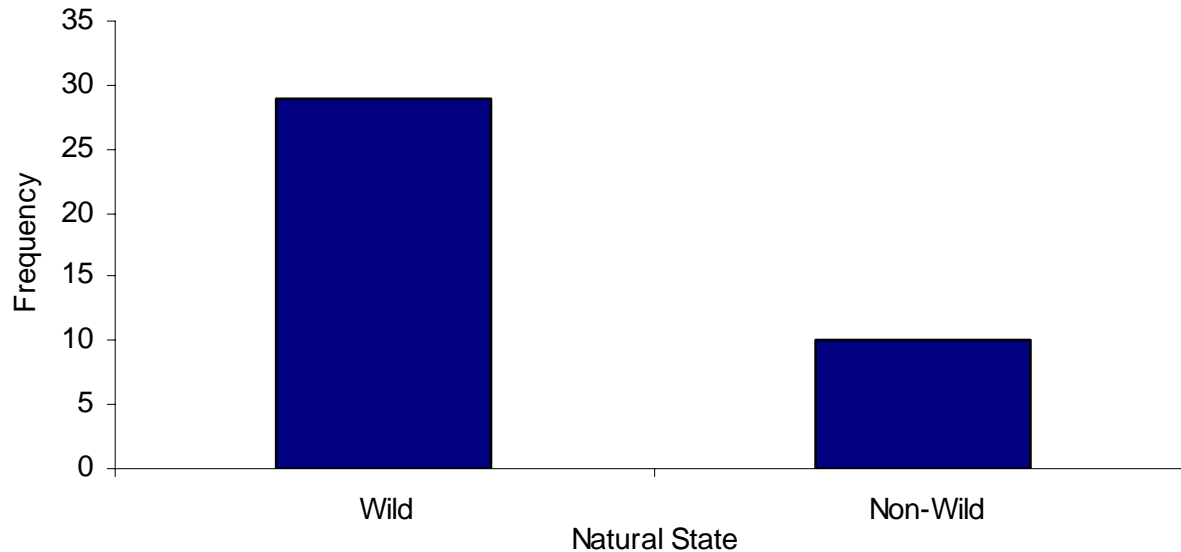
Frequency Bar Graph for the Natural State of a Sample of Mammals



- Why???

# This graph good!

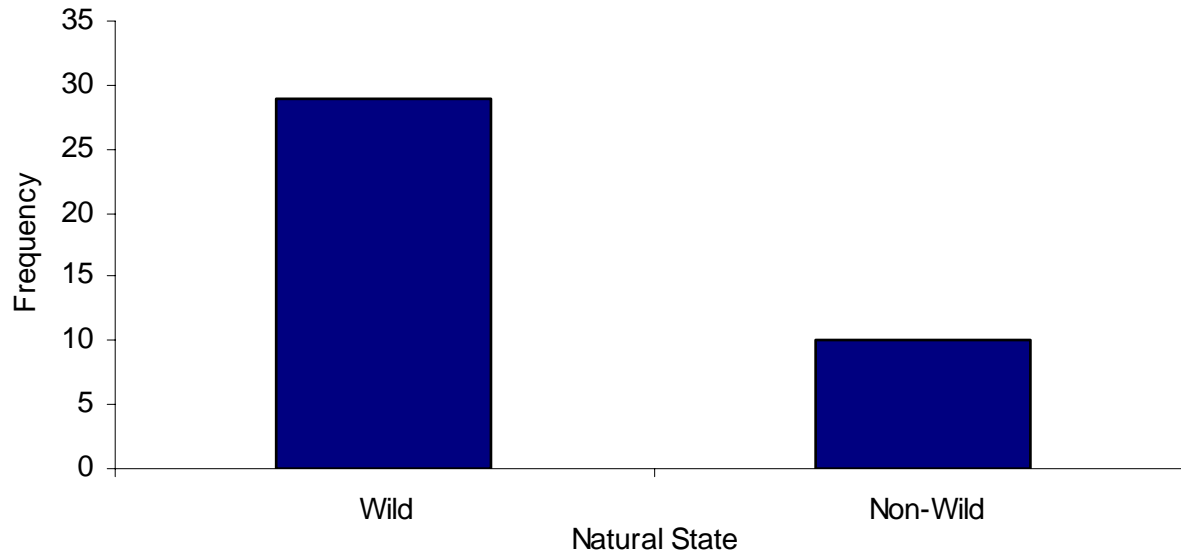
Frequency Bar Graph for the Natural State of a Sample of Mammals



- The title tells the reader what type of graph this is, the name of the variable being examined and what is being examined, *a sample of mammals* rather than all mammals.

# This graph good!

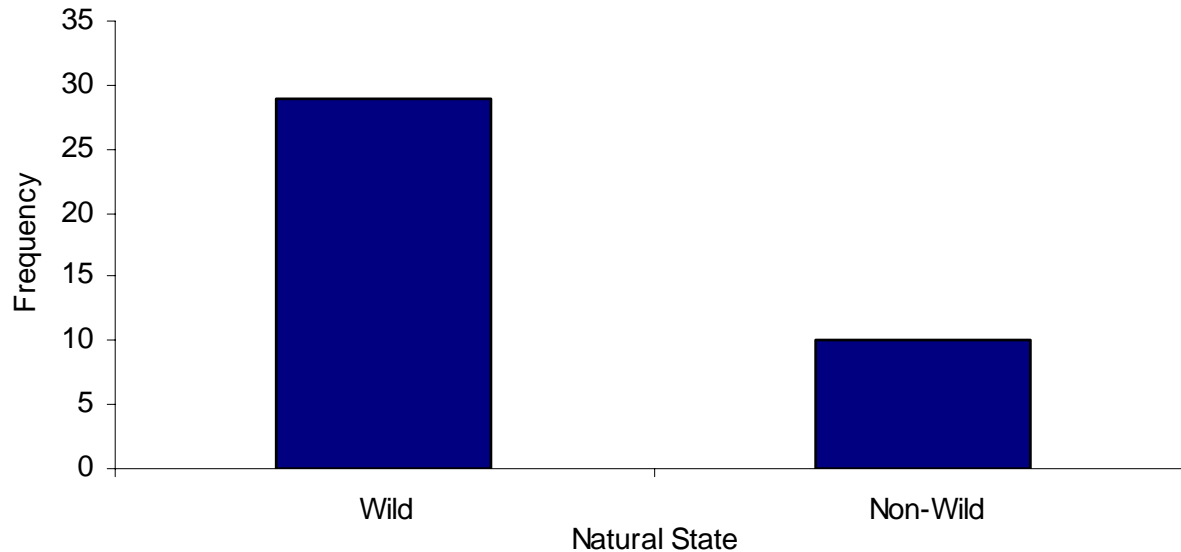
Frequency Bar Graph for the Natural State of a Sample of Mammals



- The horizontal axis is present and labeled with the variable being examined, the natural state of the mammals under consideration, and the bars for the bar graph are labeled with the values of the variable, Wild and Non-Wild.

# This graph good!

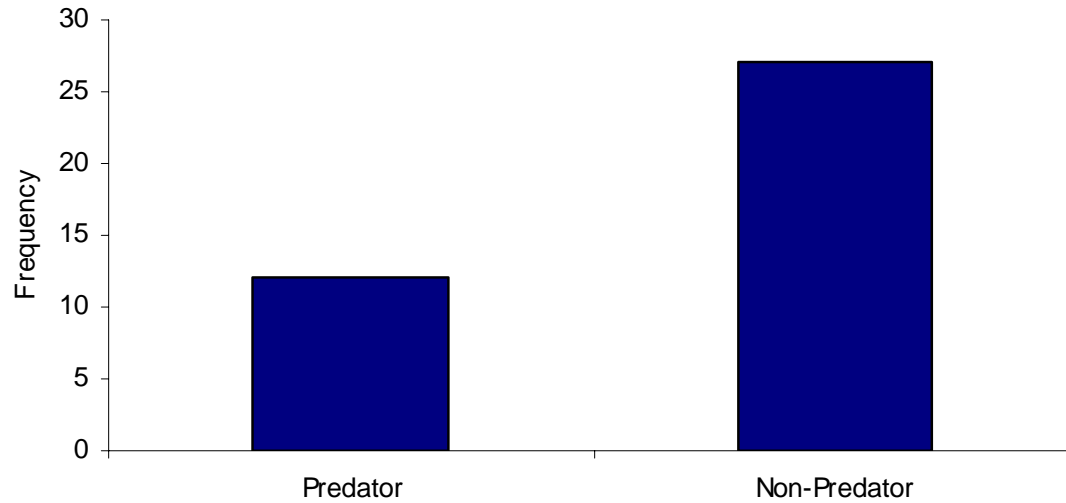
Frequency Bar Graph for the Natural State of a Sample of Mammals



- The vertical axis is present and labeled, Frequency, and the axis has both a scale and tick marks to indicate the measure that corresponds to this scale.

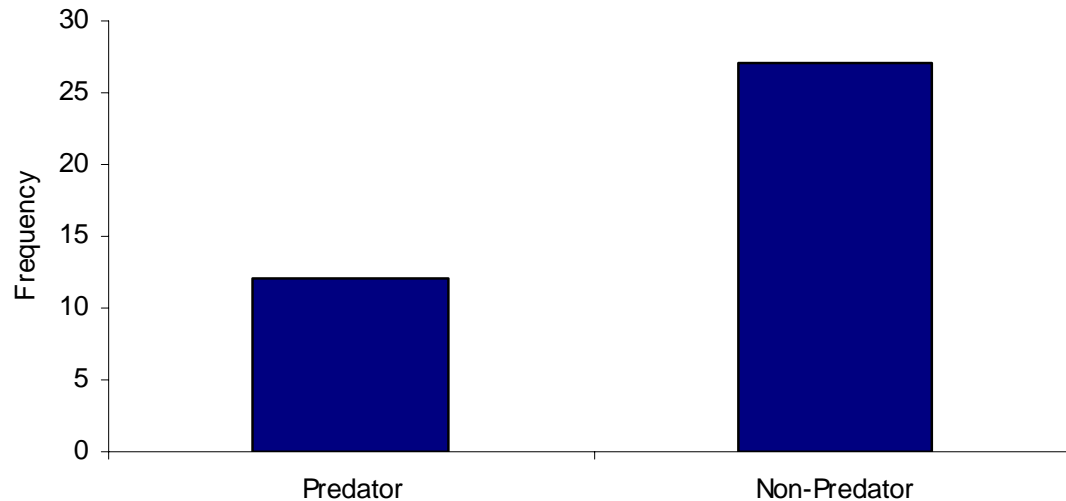
# Is this graph good???

Frequency Bar Graph for Mammals



# Is this graph good???

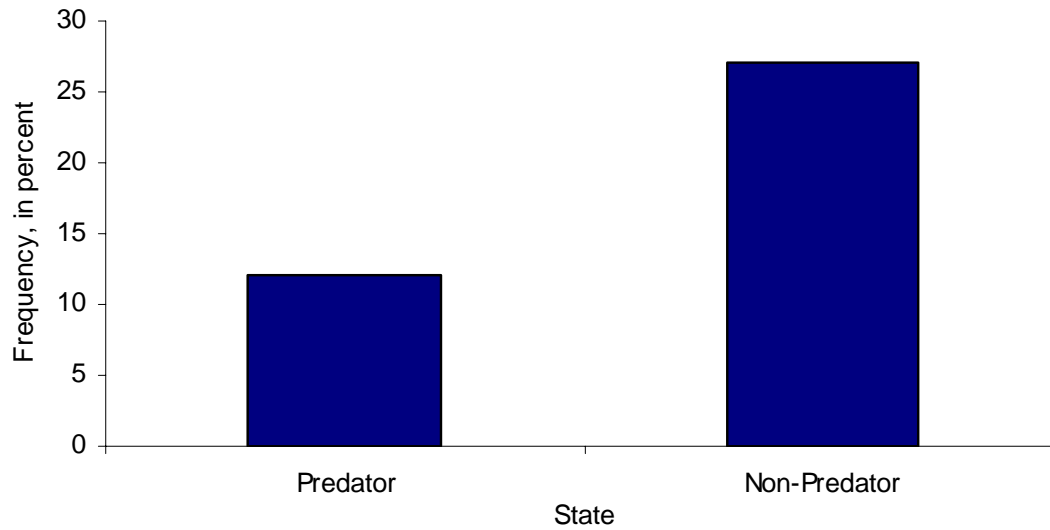
Frequency Bar Graph for Mammals



- This is not a good graph because the title is meaningless (Is this graph for *all* mammals?) and the horizontal axis is not labeled with the name of the variable (What is the variable being examined?).

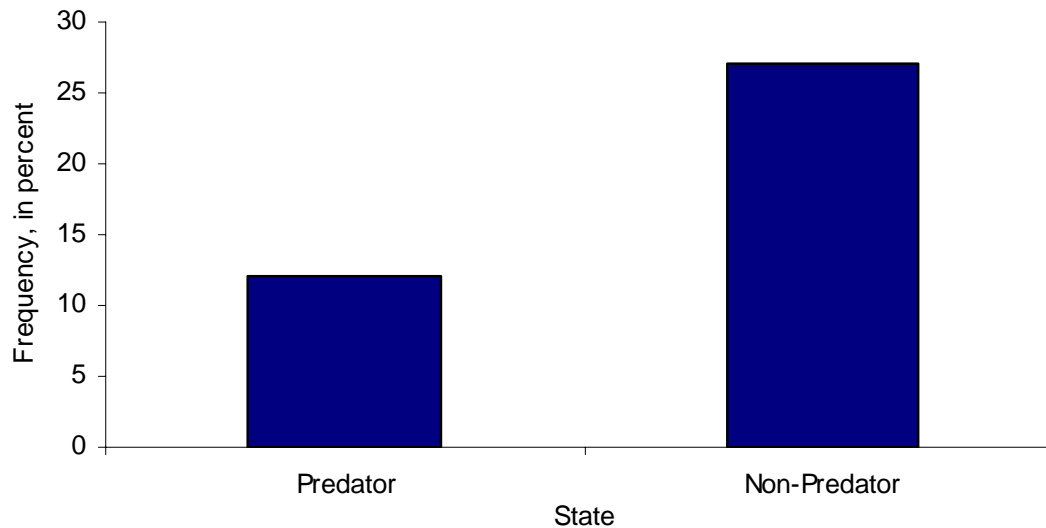
# Is this graph good???

Frequency Bar Graph for Mammals



# Is this graph good???

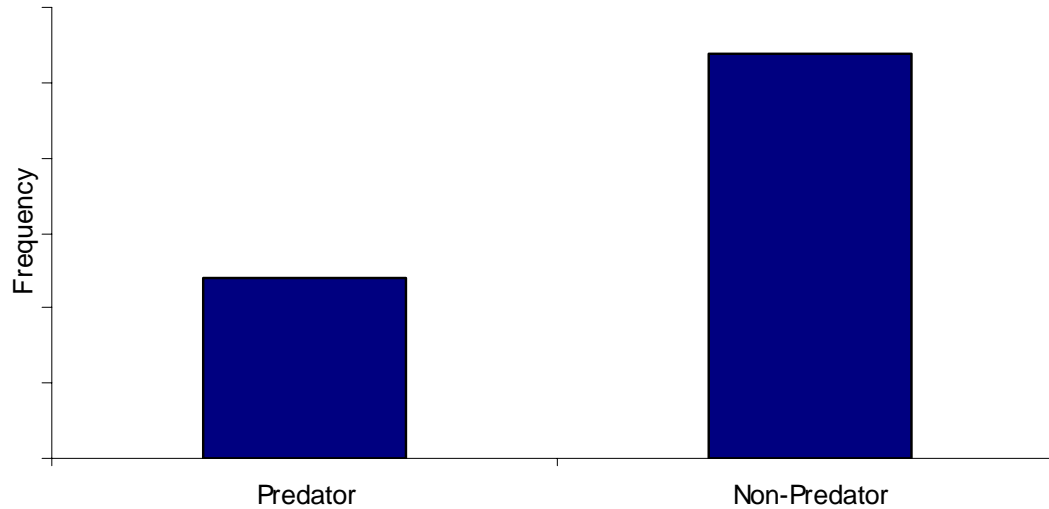
Frequency Bar Graph for Mammals



- This is not a good graph because the title is meaningless (Is this graph for *all* mammals?) and the horizontal axis is not labeled in a meaningful way (What does state mean?), and frequency is a count and counts are not measured in percent; frequency has no units.

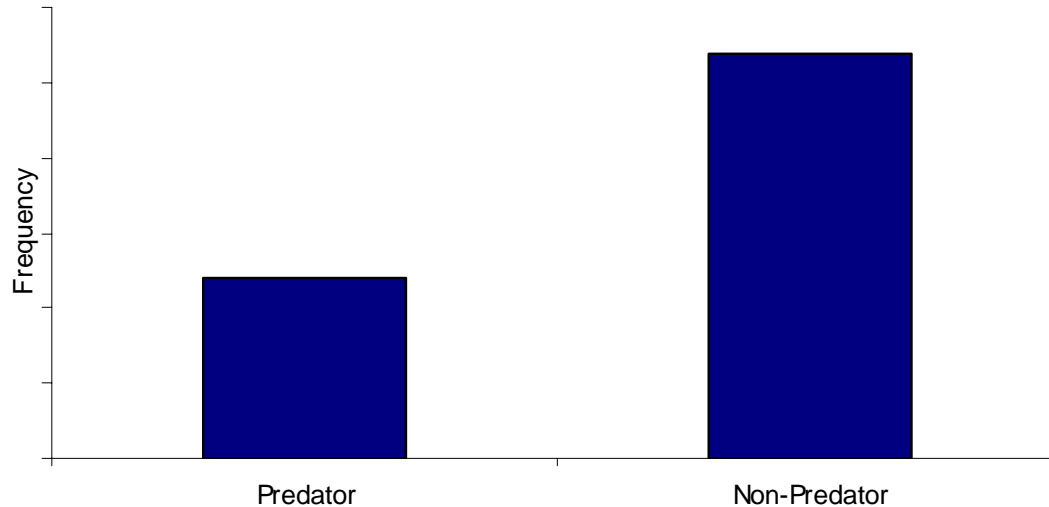
# Is this graph good???

Frequency Bar Graph for Predatory State



# Is this graph good???

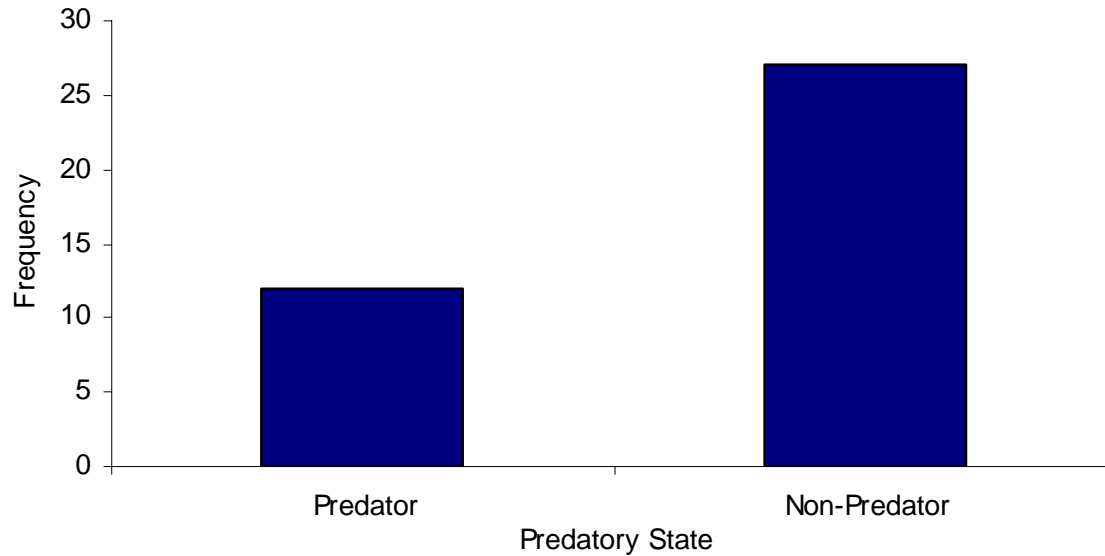
Frequency Bar Graph for Predatory State



- This is not a good graph because the title is meaningless (Predatory state of/for what?), the horizontal axis is not labeled with the name of the variable (What is the variable being examined?), and there is no scale on the vertical axis (What is the height of the bars?).

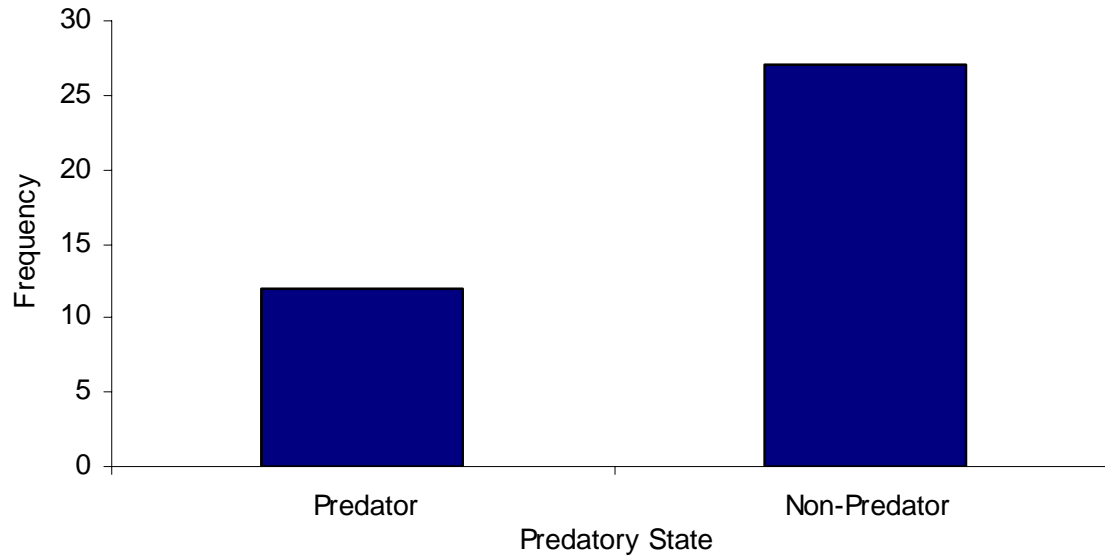
# This is a good graph!

Frequency Bar Graph for the Predatory State of a Sample of Mammals



# This is a good graph!

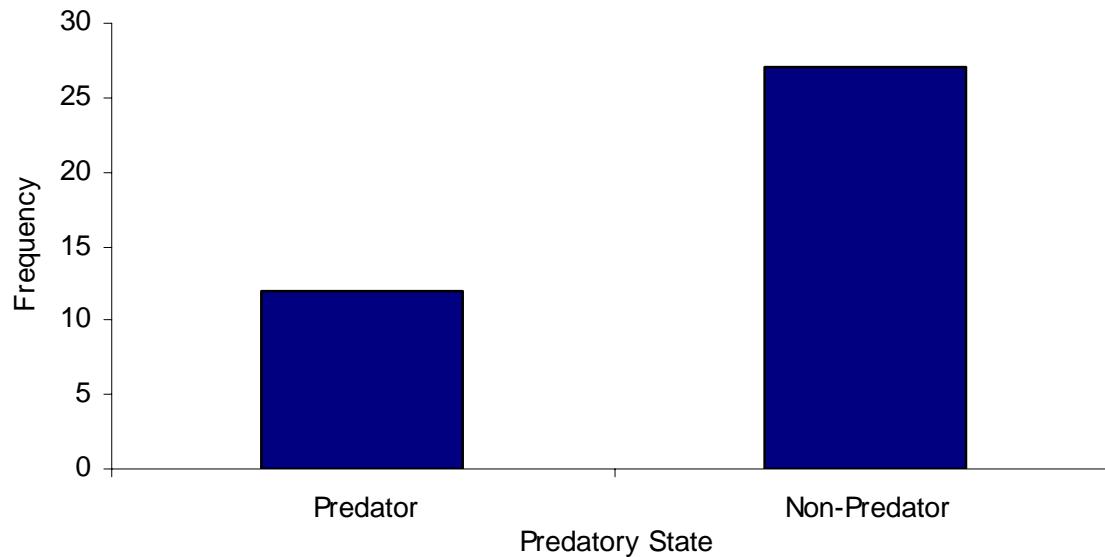
Frequency Bar Graph for the Predatory State of a Sample of Mammals



- Why???

# This is a good graph!

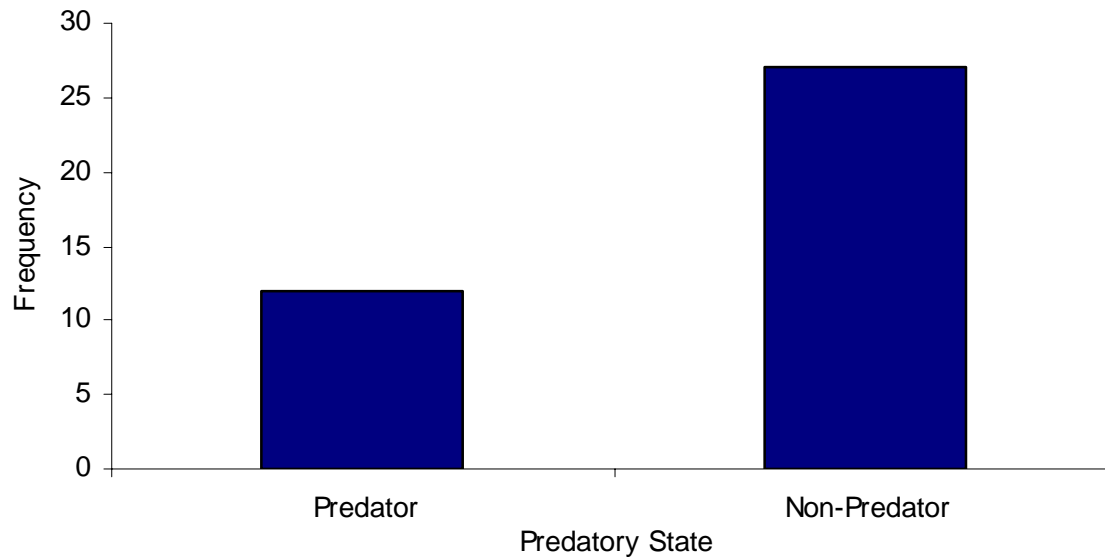
Frequency Bar Graph for the Predatory State of a Sample of Mammals



- The title tells the reader what type of graph this is as well as what is being examined (the variable is the Predatory State) and for what, a *sample* of mammals rather than all mammals.

# This is a good graph!

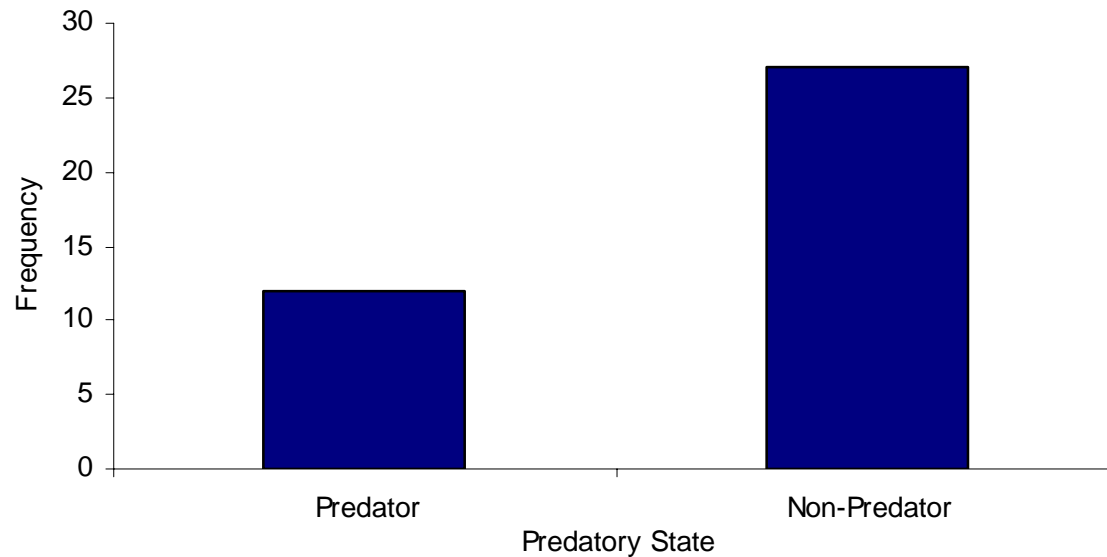
Frequency Bar Graph for the Predatory State of a Sample of Mammals



- The horizontal axis is present and labeled with the name of the variable, and the bars for the bar graph are labeled with the values of the variable, Predator and Non-Predator.

# This is a good graph!

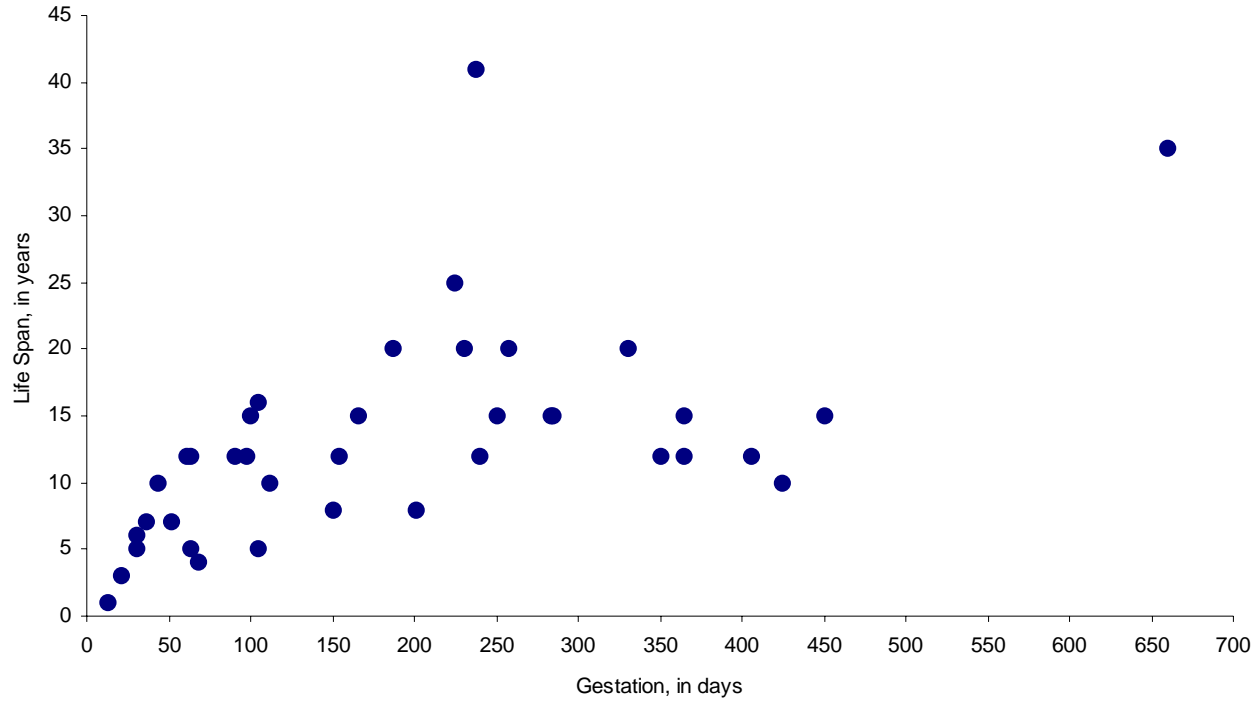
Frequency Bar Graph for the Predatory State of a Sample of Mammals



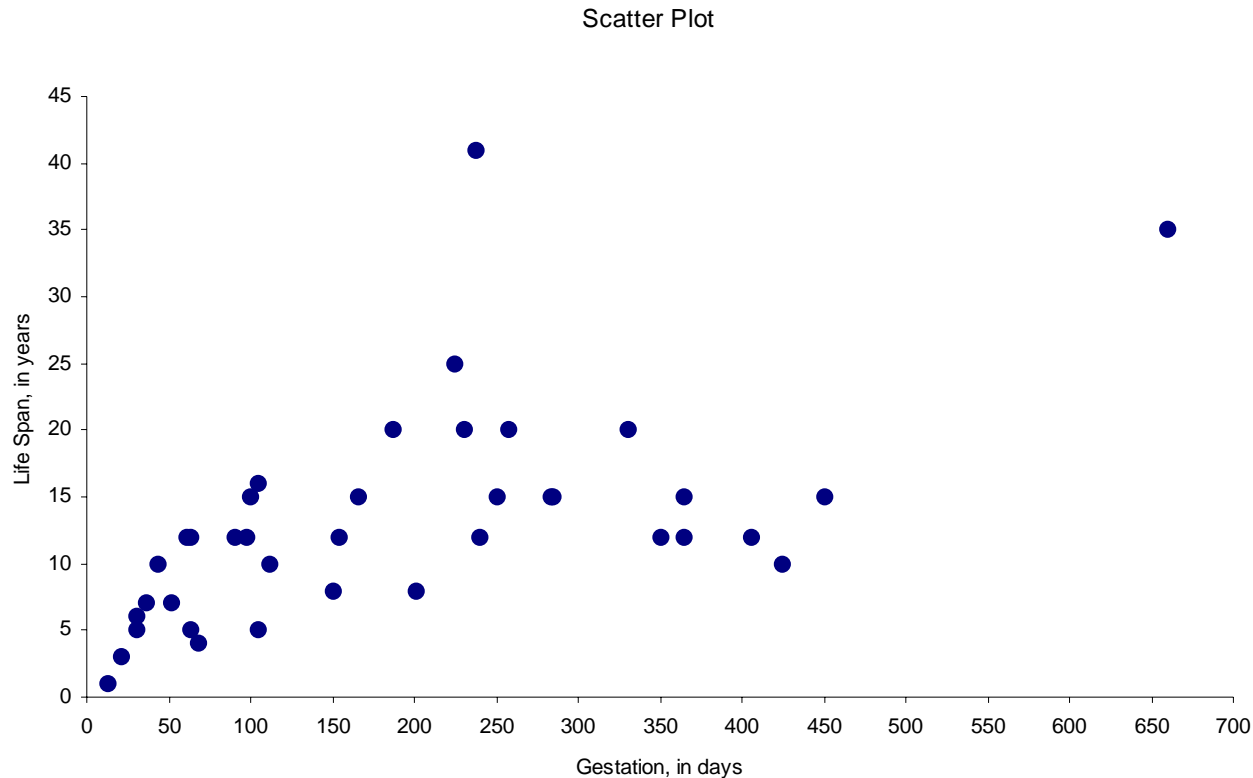
- The vertical axis is present and labeled with a scale with tick marks and as well as with a meaningful axis label, in this case Frequency since this is a frequency bar graph.

# Is this graph good???

Scatter Plot



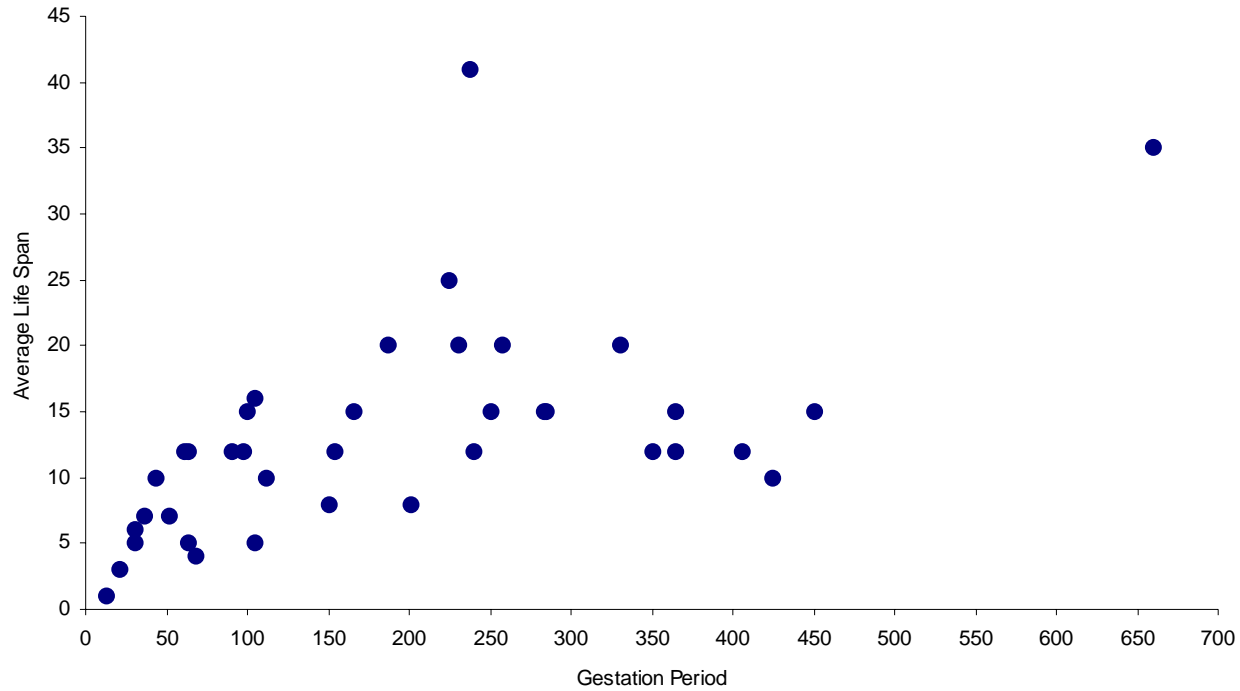
# Is this graph good???



- This is not a good graph because the title is meaningless (Scatter plot for what?), the horizontal axis is not labeled in a meaningful way (gestation is not a quantitative variable), and the vertical axis is not labeled in a meaningful way (life span can be varies even within species and can be measured in a variety of ways. Is this the average life span? The maximum life span? The minimum life span?).

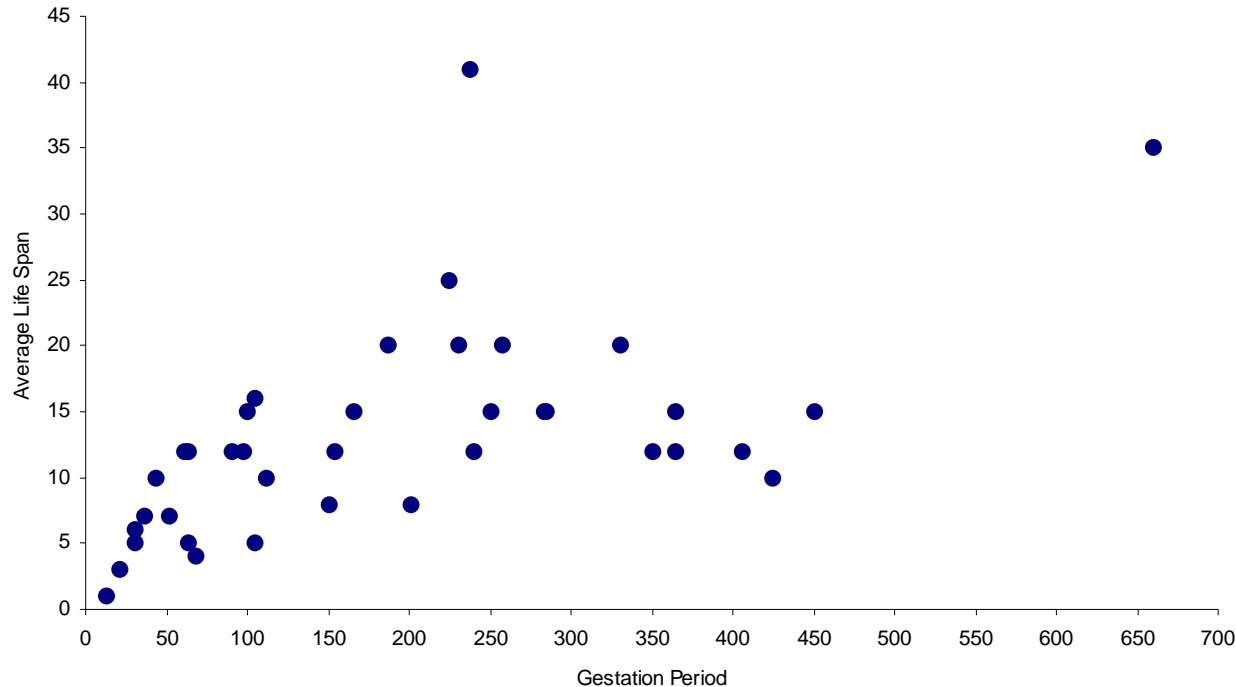
# Is this graph good???

Gestation Period and the Average Life Span for Mammals



# Is this graph good???

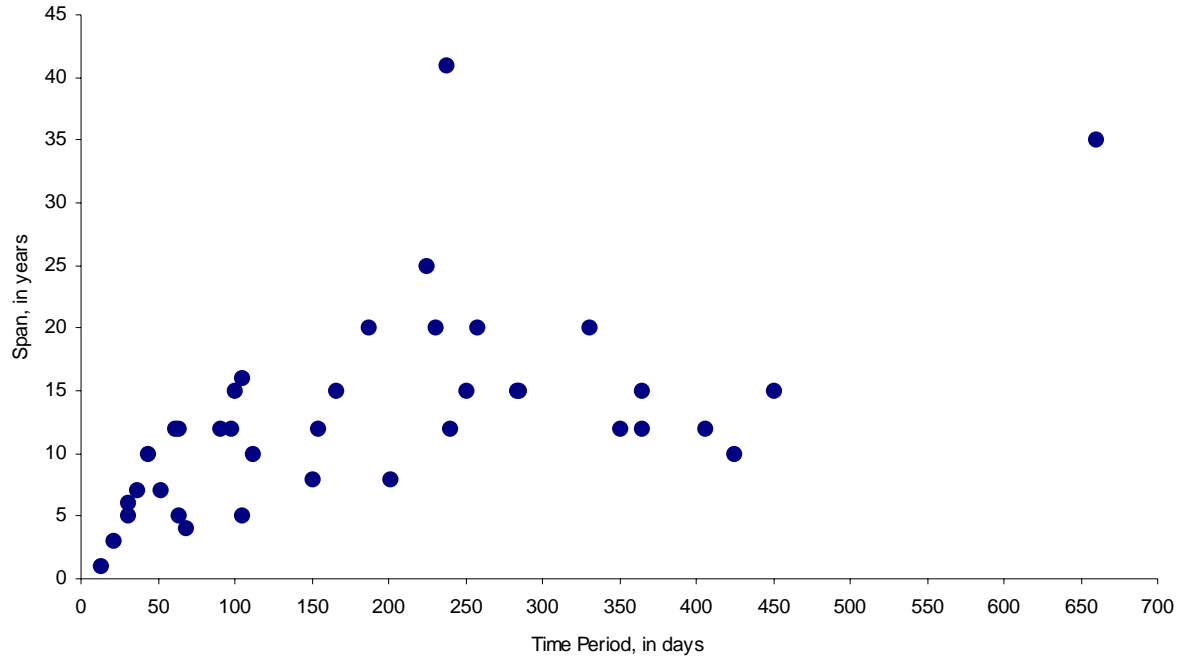
Gestation Period and the Average Life Span for Mammals



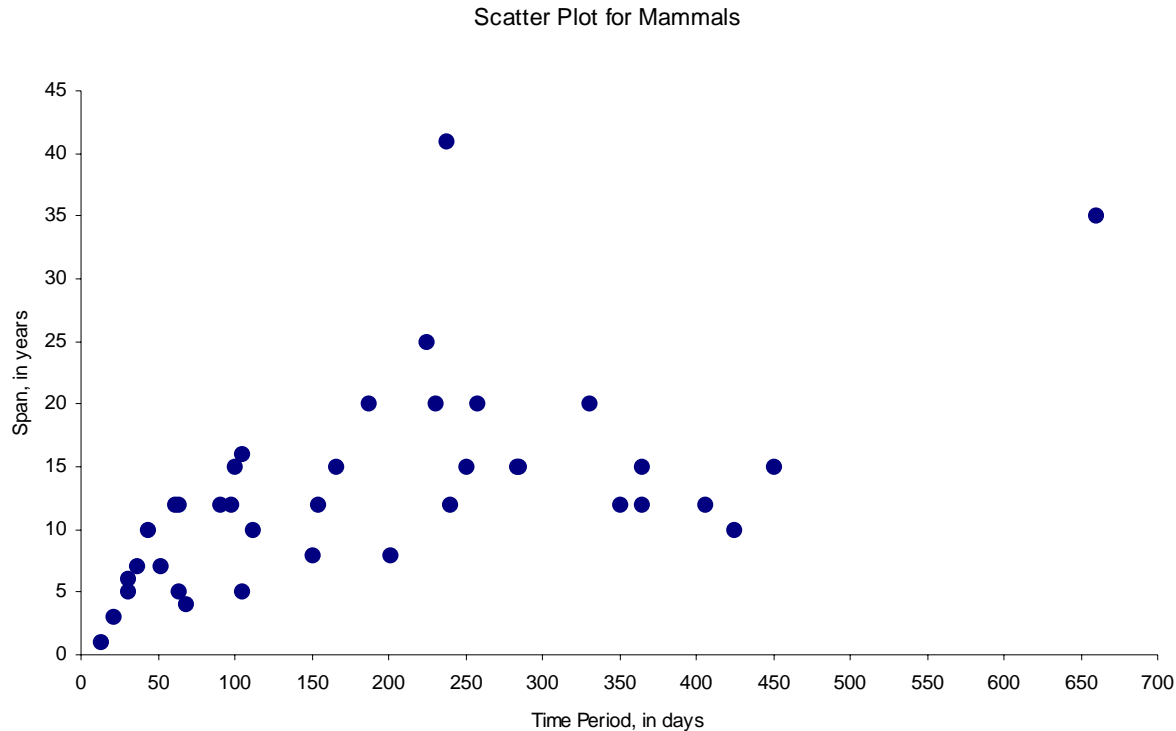
- This is not a good graph because the title is meaningless (Is this graph for *all* mammals? The title by itself makes no sense.), the variable on the horizontal axis does not have any units (How is the gestation period measured?), and the variable on the vertical axis does not have any units (how is the average life span measured?).

# Is this graph good???

Scatter Plot for Mammals



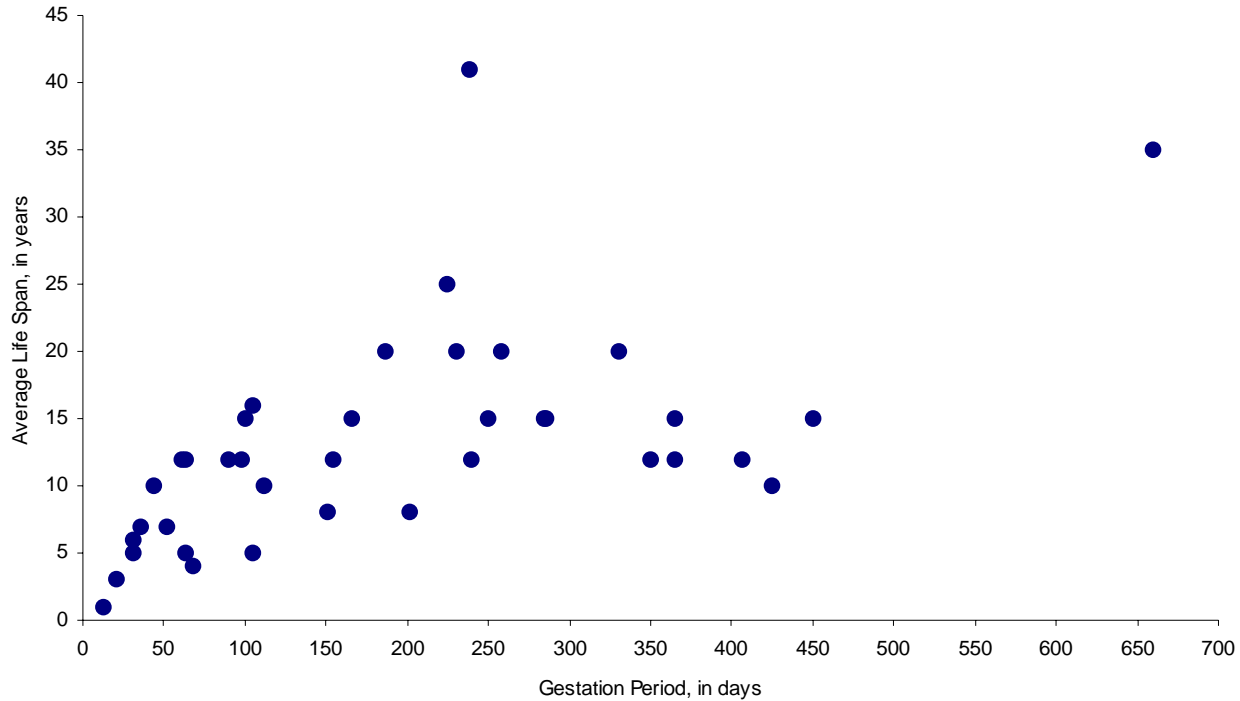
# Is this graph good???



- This is not a good graph because the title is meaningless (What variables are being examined? That is, this is a scatter plot of what? Is this graph for *all* mammals?), the horizontal axis is not labeled in a meaningful way (What is the variable being examined? What is the meaning of "time period" What time period is being considered?), and the vertical axis is not labeled in a meaningful way (What is the variable being examined? What is the meaning of "Span"?).

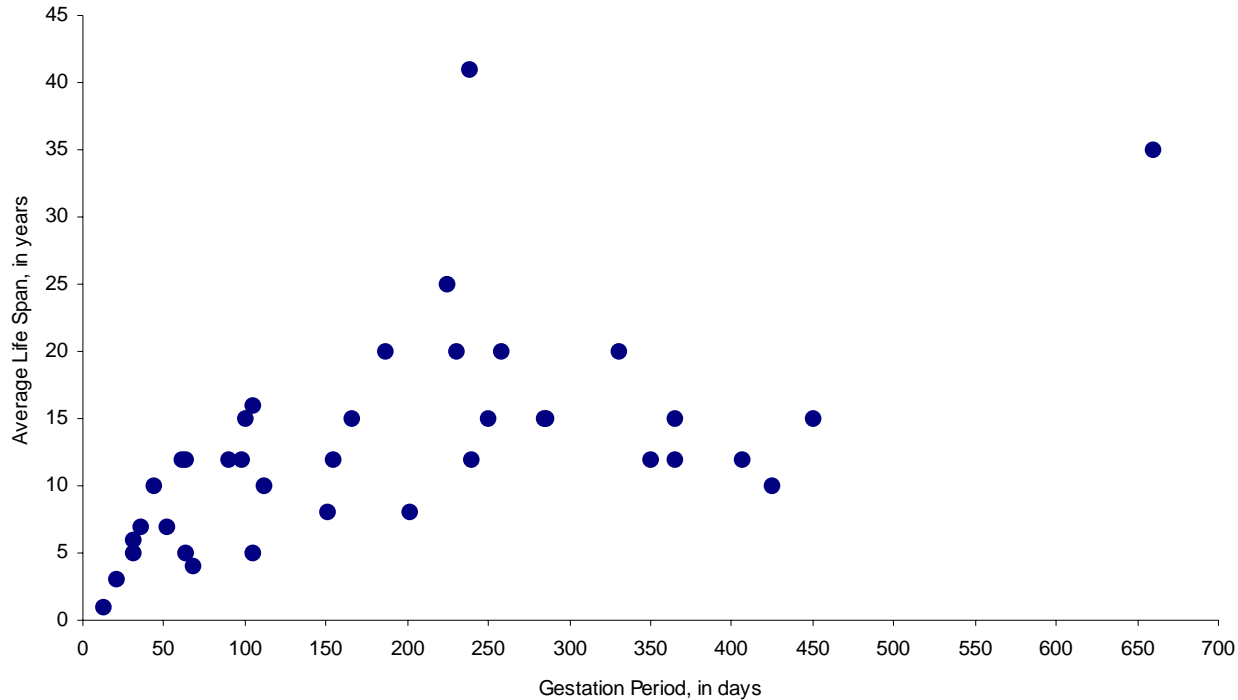
# This is a good graph!

Scatter Plot for the Gestation Period versus the Average Life Span for a Sample of Mammals



# This is a good graph!

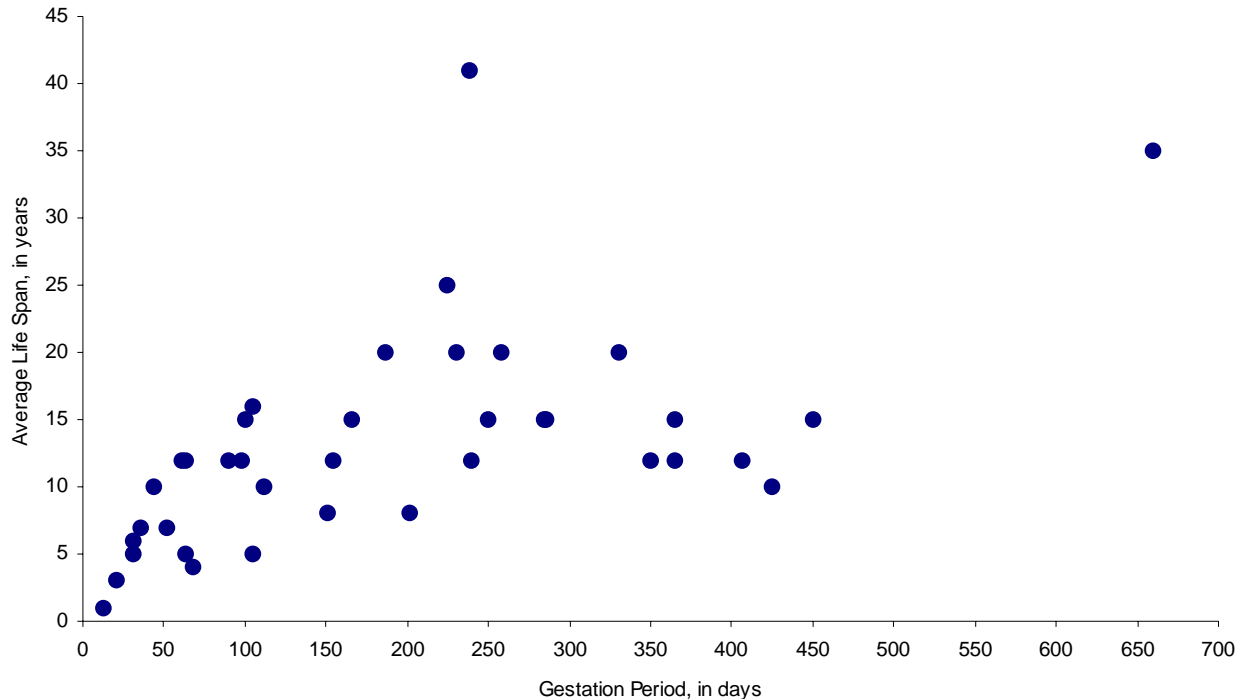
Scatter Plot for the Gestation Period versus the Average Life Span for a Sample of Mammals



- Why???

# This is a good graph!

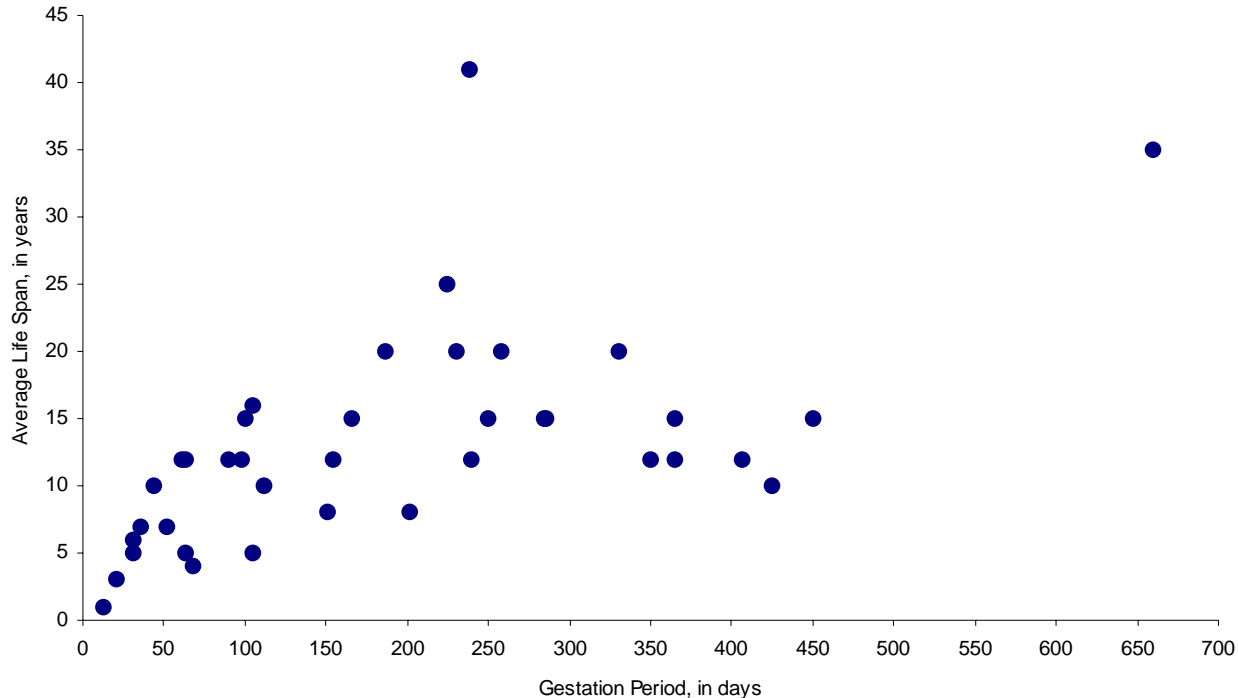
Scatter Plot for the Gestation Period versus the Average Life Span for a Sample of Mammals



- The graph has a meaningful title, informing the reader of the graph type, a scatter plot, as well as the variables being considered, the gestation period and the average life span, and what is being examined, a *sample* of mammals rather than all mammals.

# This is a good graph!

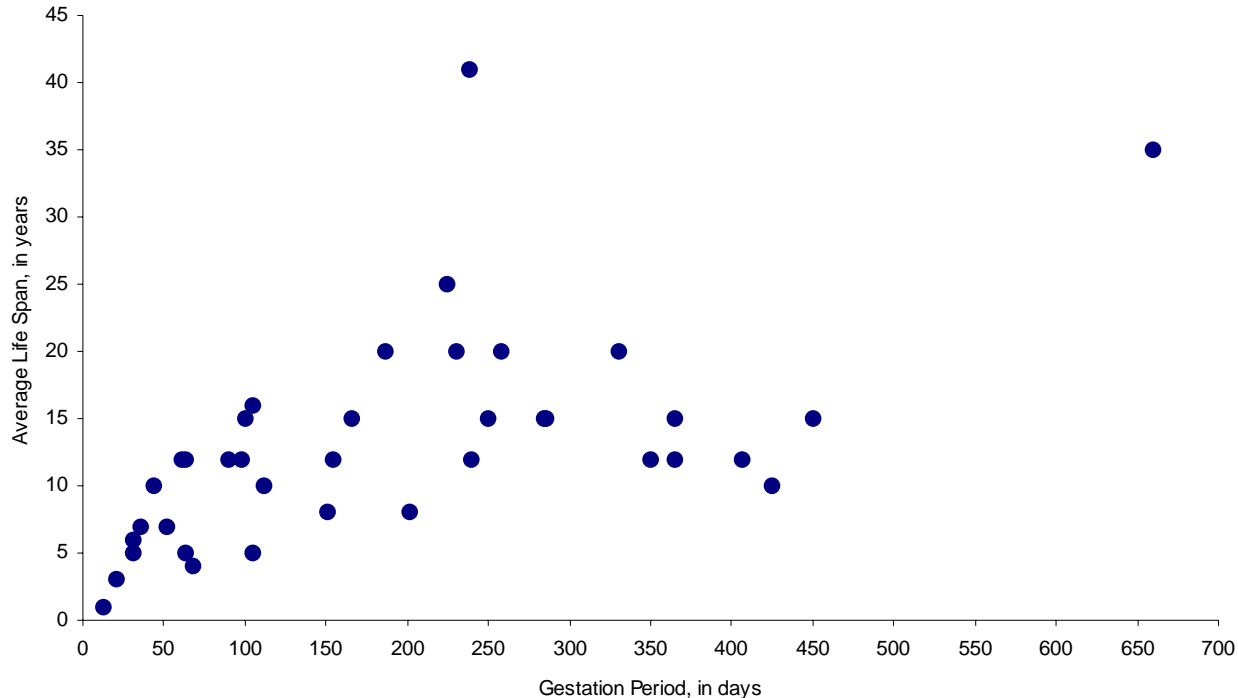
Scatter Plot for the Gestation Period versus the Average Life Span for a Sample of Mammals



- The graph has a horizontal axis with a meaningful axis label, the variable being examined together with its units, and a meaningful scale with numbers and corresponding tick marks.

# This is a good graph!

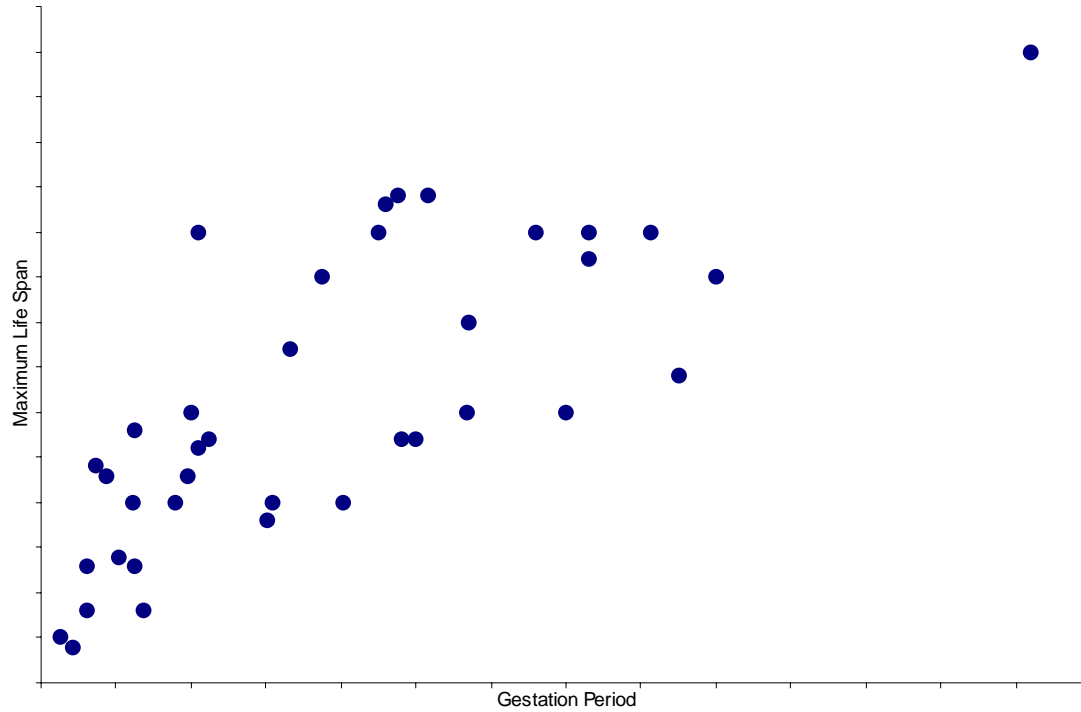
Scatter Plot for the Gestation Period versus the Average Life Span for a Sample of Mammals



- The graph has a vertical axis with a meaningful axis label, the variable being examined together with its units, and a meaningful scale with numbers and corresponding tick marks.

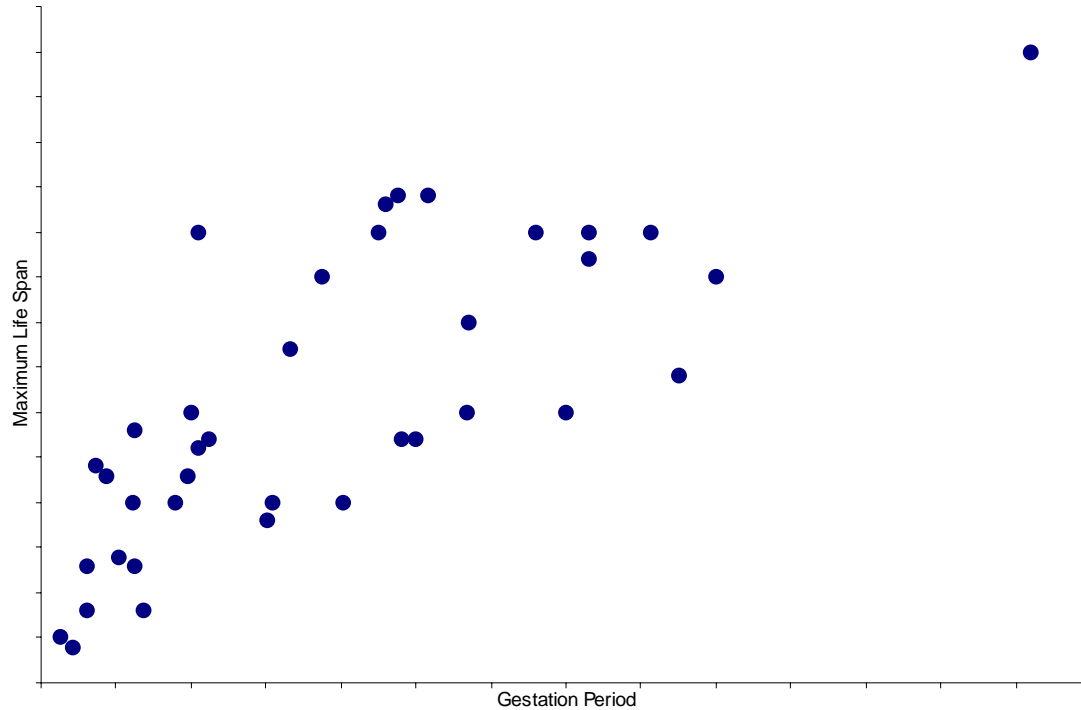
# Is this graph good???

Scatter Plot for the Gestation Period versus the Maximum Life Span for a Sample of Mammals



# Is this graph good???

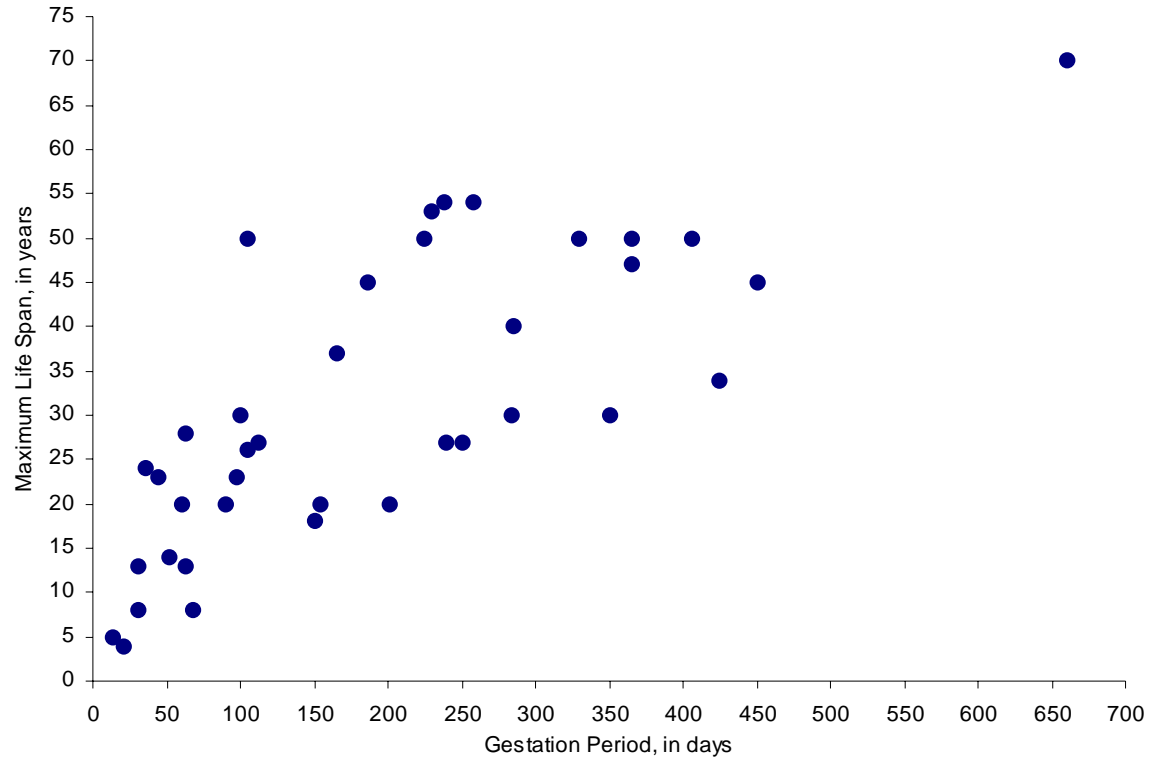
Scatter Plot for the Gestation Period versus the Maximum Life Span for a Sample of Mammals



- This is not a good graph because neither the horizontal axis nor the vertical axis have scales (what are the numerical values that correspond to the tick marks?) and the units for the variables on the horizontal axis and on the vertical axis are missing (What are the units? How is the gestation period measured? How is the maximum life span measured?)

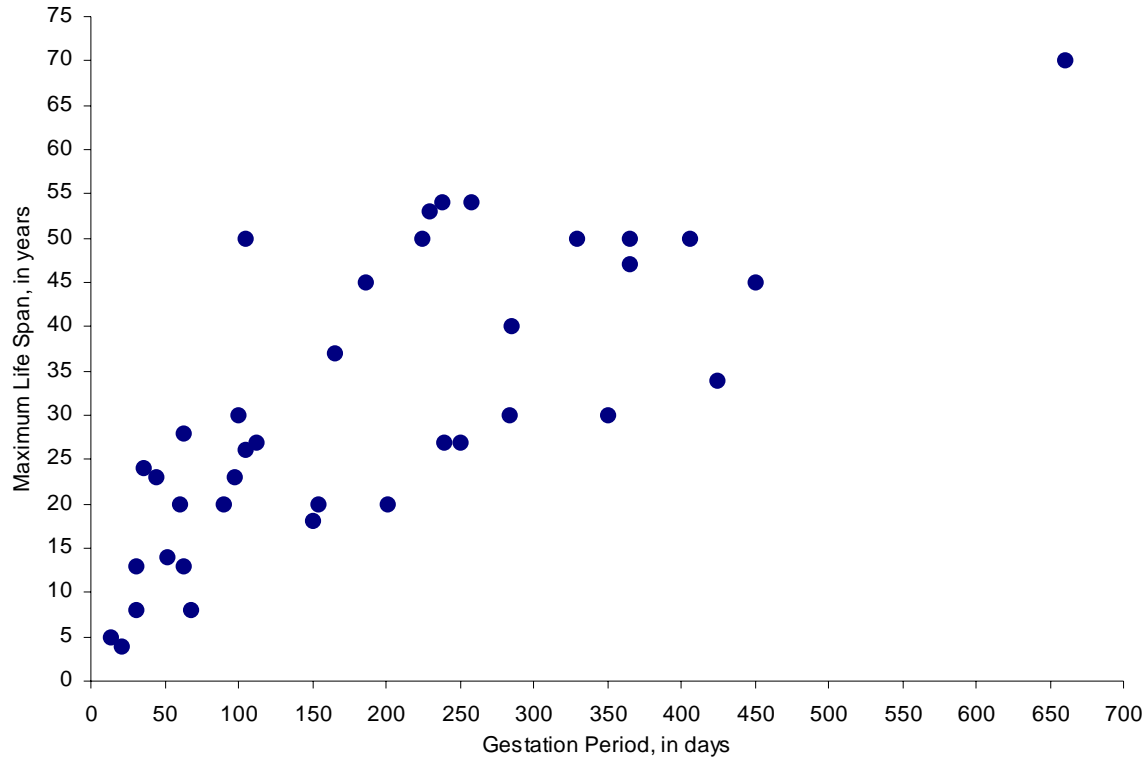
# This is a graph good!

Scatter Plot for the Gestation Period versus the Maximum Life Span for a Sample of Mammals



# This is a graph good!

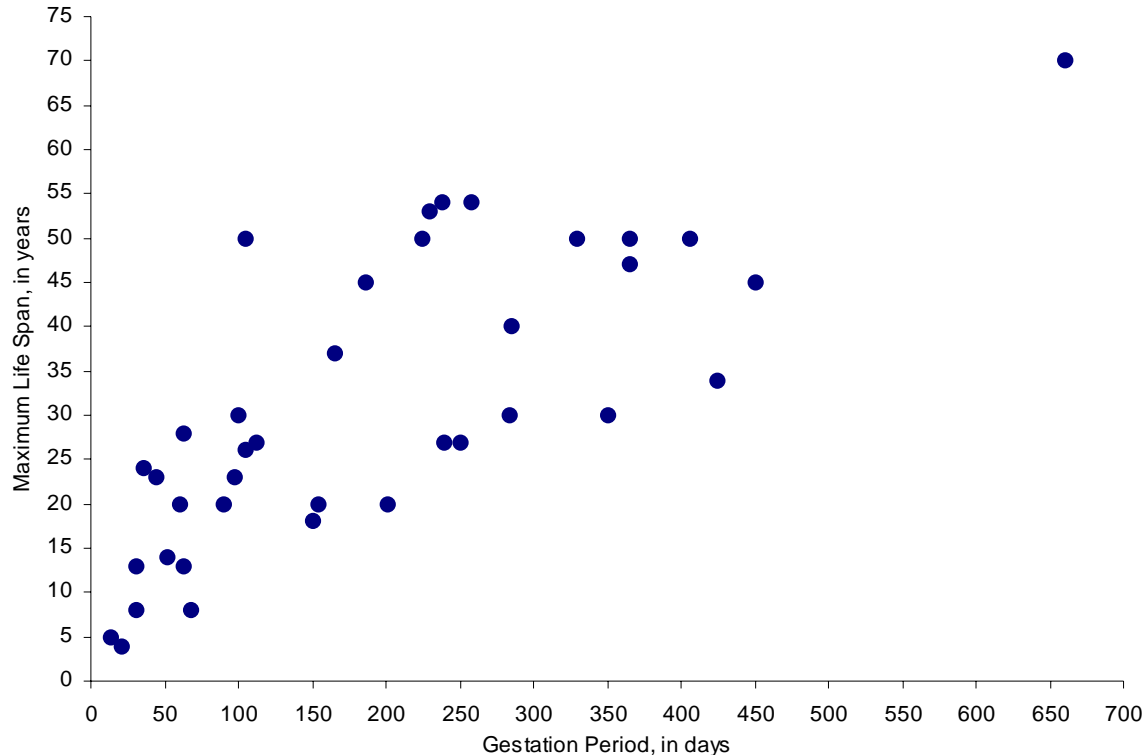
Scatter Plot for the Gestation Period versus the Maximum Life Span for a Sample of Mammals



- Why???

# This is a graph good!

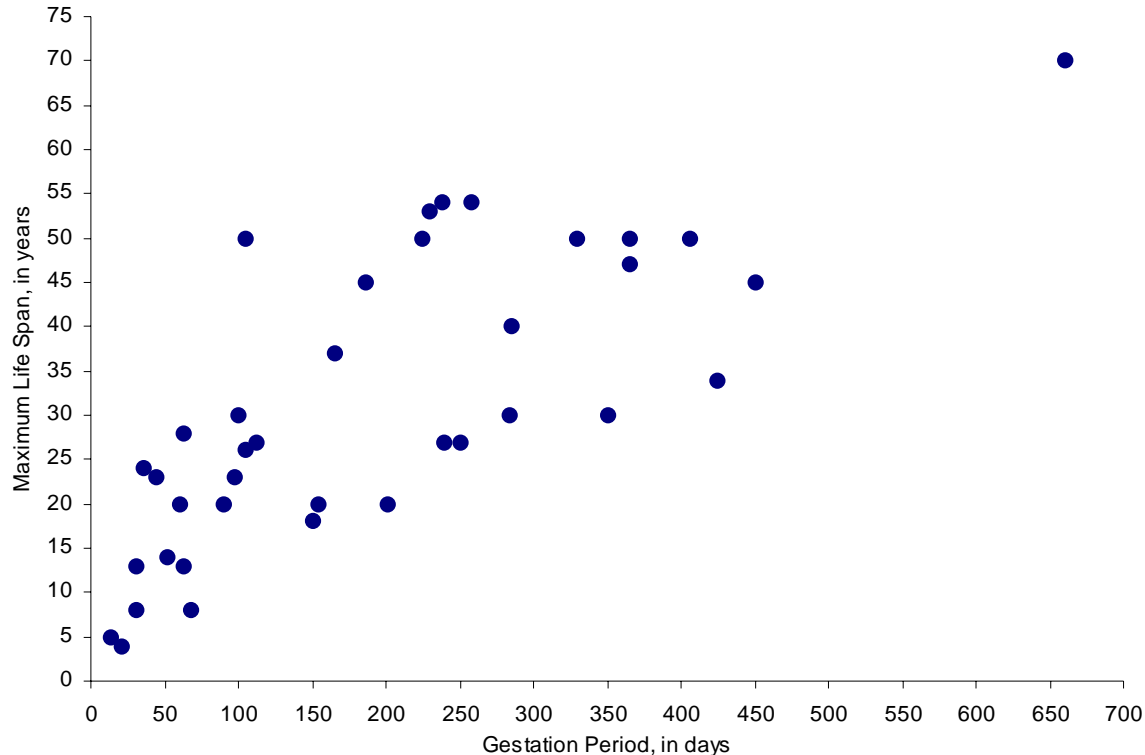
Scatter Plot for the Gestation Period versus the Maximum Life Span for a Sample of Mammals



- This is a good graph because the title informs the reader of the graph type, the variables being examined, and what is being studied, a *sample* of mammals rather than all mammals.

# This is a graph good!

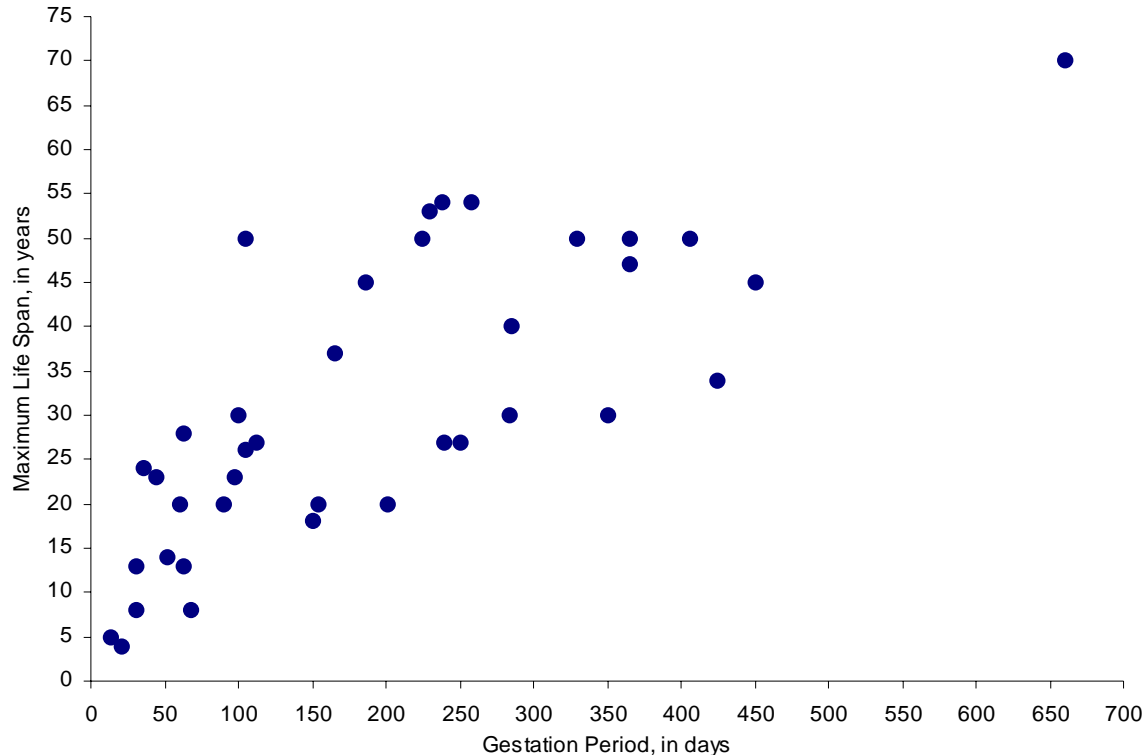
Scatter Plot for the Gestation Period versus the Maximum Life Span for a Sample of Mammals



- This is a good graph because the horizontal axis is present, has an appropriate label, the variable with its units, and has an appropriate scale with both numbers and tick marks.

# This is a graph good!

Scatter Plot for the Gestation Period versus the Maximum Life Span for a Sample of Mammals



- This is a good graph because the vertical axis is present, has an appropriate label, the variable with its units, and has an appropriate scale with both numbers and tick marks.