Welcome to Class

- Class is full
- HW #1 from last class:
  - Fill out the Student Profile sheet
  - Record the distance and time of your drive to West Valley on Thursday morning
    - Time to the nearest minute
    - Distance to the nearest tenth of a mile
- Please enter your distance and time data on the board
Types of Data

- Categorical (or Nominal)
  - Data identified by category (or name) only

- Ordinal
  - Data identified by order only (relative position)

- Numeric
  - Discrete – things you count
  - Continuous – things you measure

- Paired Data
  - Categorical – Categorical
  - Categorical – Numeric
  - Numeric – Numeric
Types of Graphs

- Choose the correct graph for the type of data
  - Categorical
    - Pie Chart, Bar Graph, Pareto Chart, Pictograph
  - Numeric
    - Histogram, Dot Plot, Stem and Leaf Display
  - Paired Categorical
    - Stacked Bar, Relative Stacked Bar, Multiple Pie Charts
  - Paired Numeric
    - Scatter Plot, Time Plot
# Pie Chart

<table>
<thead>
<tr>
<th>State</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby</td>
<td>48</td>
</tr>
<tr>
<td>Productive</td>
<td>100</td>
</tr>
<tr>
<td>Scheduled</td>
<td>8</td>
</tr>
<tr>
<td>Unscheduled</td>
<td>12</td>
</tr>
</tbody>
</table>
Bar Charts

Hours

- Unscheduled
- Scheduled
- Productive
- Standby

Hours

- Standby
- Productive
- Scheduled
- Unscheduled
## Pareto Chart

<table>
<thead>
<tr>
<th>HOLD CODE</th>
<th>DAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGDIS</td>
<td>1621.9</td>
</tr>
<tr>
<td>DEV</td>
<td>1115.1</td>
</tr>
<tr>
<td>MFG</td>
<td>743.4</td>
</tr>
<tr>
<td>IET</td>
<td>574.4</td>
</tr>
<tr>
<td>DISPO</td>
<td>540.6</td>
</tr>
<tr>
<td>MIA</td>
<td>304.1</td>
</tr>
<tr>
<td>LOGIS</td>
<td>304.1</td>
</tr>
<tr>
<td>R&amp;DDEV</td>
<td>202.7</td>
</tr>
<tr>
<td>RECIPE</td>
<td>135.2</td>
</tr>
<tr>
<td>PRPS</td>
<td>101.4</td>
</tr>
<tr>
<td>PRBFA</td>
<td>101.4</td>
</tr>
<tr>
<td>CONTAM</td>
<td>101.4</td>
</tr>
<tr>
<td>TLNAVL</td>
<td>33.8</td>
</tr>
<tr>
<td>FAIL</td>
<td>33.8</td>
</tr>
<tr>
<td>PRODEV</td>
<td>33.8</td>
</tr>
<tr>
<td>INSPEC</td>
<td>33.8</td>
</tr>
<tr>
<td>SCRTCH</td>
<td>33.8</td>
</tr>
<tr>
<td>MASK-D</td>
<td>33.8</td>
</tr>
<tr>
<td>WEINST</td>
<td>33.8</td>
</tr>
</tbody>
</table>

![Days on Hold by Reason Code](image)
Histogram

- Determine minimum and maximum values
- Calculate the range = max – min
  - Adjust for rounding
- Find pairs of numbers that multiply to cover the range
  - One of the pairs is the number of bars desired
  - The other will be the width of each bar
- Set the endpoints
  - Consider how the data might be rounded
  - Shift the bar endpoints to the “half” points
    - Unless data is known to be truncated
- No right or wrong number of bars, but ...
  - Too few or too many and you won’t get a picture of the data
Notice the difference

- In the bar chart, they don’t
- There is no numeric relationship between the categories

- In the histogram, the bars touch
- Horizontal axis represents a portion of the number line
Dot Plot, Stem and Leaf

1 2 3 4 5 6 7 8 9 10

0 122234
0 589
## Stacked Bar

<table>
<thead>
<tr>
<th></th>
<th>Tool A</th>
<th>Tool B</th>
<th>Tool C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby</td>
<td>24</td>
<td>24</td>
<td>36</td>
</tr>
<tr>
<td>Productive</td>
<td>108</td>
<td>76</td>
<td>116</td>
</tr>
<tr>
<td>Scheduled</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Unscheduled</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

The diagram illustrates the usage of tools across different categories: Unscheduled, Scheduled, Productive, and Standby. Each tool has a stacked bar graph representing the breakdown of usage across these categories.
# Relative Stacked Bar

<table>
<thead>
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<th>Tool C</th>
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<td>8</td>
</tr>
<tr>
<td>Unscheduled</td>
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<td>8</td>
</tr>
</tbody>
</table>

![Relative Stacked Bar Chart](image-url)
Normalizing Data

- Techniques that allows data from different populations to be compared

- Relative Stacked Bar
  - By using percentages rather than raw counts, the relative stacked bar allows for comparison of data with different sample sizes

- Pie Charts
  - Because they are based on the percentage of the circle, pie charts are also good for comparing data across populations
### Time Plot or Sequence Plot

<table>
<thead>
<tr>
<th>Day</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/1/2006</td>
<td>22808</td>
</tr>
<tr>
<td>12/2/2006</td>
<td>23709</td>
</tr>
<tr>
<td>12/3/2006</td>
<td>21780</td>
</tr>
<tr>
<td>12/4/2006</td>
<td>22456</td>
</tr>
<tr>
<td>12/5/2006</td>
<td>21679</td>
</tr>
<tr>
<td>12/6/2006</td>
<td>23187</td>
</tr>
<tr>
<td>12/7/2006</td>
<td>22156</td>
</tr>
</tbody>
</table>
Temperature Map (Choropleth)
From SJ Mercury News, 8/31/14

- **Antioch**
  - Population: 34% White, 17% Black, 33% Latino, 11% Asian
  - Police Dept.: 73, 7, 13, 7

- **Brentwood**
  - Pop.: 56, 6, 26, 8
  - P.D.: 72, 3, 16, 9

- **Daly City**
  - Pop.: 14, 3, 23, 57
  - P.D.: 68, 4, 11, 17

- **Napa**
  - Pop.: 57, 1, 38, 2
  - P.D.: 81, 1, 15, 2

- **Novato**
  - Pop.: 71, 2, 7, 17
  - P.D.: 82, 1, 10, 8

*Less than 1% black and Latino; remainder declined to state

Source: Census Bureau, police departments

BAY AREA NEWS GROUP
Best Graph Ever?

Graph of Napoleon's Russian campaign of 1812 by Charles Minard, 1869

Tableau graphique de la température en degrés du thermomètre de Réaumur au dessous de zéro.
Pictographs

- Uses pictures to create “bars”
Inaccurate?

- What part of the pencil represents the value?
- There are more than twice as many students in grades 1-8 as grades 9 – 12, but is the pencil more than twice as long? Is it drawn to appear more than twice as big?
Graphs can be misleading

- How much more do men make? What does the graph imply?
  - Graph does not start at zero
  - Increasing the width and perceived depth of picture along with the height
Homework

- HW #2:
  - Find examples of 5 different types of graph
  - Internet or newspapers/magazines
  - Real data, not educational examples of types of graphs
  - Identify the type of data being graphed
  - Identify the type of graph