Practice Quiz 2  M203J  February 20, 2009

[1] Suppose Ann, Bob and Cindy want to share a cake that's half lemon and half vanilla, as shown

```
V V L L
V V L L
```

Ann likes lemon twice as much as vanilla (so she would see two vanilla squares as having the same value as one lemon square). Bob likes vanilla twice as much as lemon, and Cindy loves lemon but hates vanilla.

Using the lone divider method, Ann cuts the cake along the horizontal line right through the center. Bob picks the top four squares and leaves the bottom four squares for Ann.

(a) Show how Ann would divide her portion into three pieces that she sees as having equal value (circle the three pieces; assume she decides to cut only along vertical lines shown). Indicate which piece Cindy picks.

Cindy picks a lemon piece

(b) Do the same for Bob.

Cindy picks the lemon piece

Answer: Ann would make three pieces as follows: the two vanilla squares taken together, one lemon square and finally the other lemon square. Cindy would pick one of the lemon squares.

(c) Fill in the blanks below, indicating how each person sees the value of the others' portions, assuming they all agree that the cake is worth $12. Indicate every instance in which someone envies someone else.

<table>
<thead>
<tr>
<th>Ann's portion</th>
<th>Bob's portion</th>
<th>Cindy's portion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ann's values</td>
<td>$4</td>
<td>$2</td>
</tr>
<tr>
<td>Bob's values</td>
<td>$5</td>
<td>$4</td>
</tr>
<tr>
<td>Cindy values</td>
<td>$3</td>
<td>$6</td>
</tr>
</tbody>
</table>

Answer: Ann envies Cindy and Bob envies Ann.

[2] Suppose Ann, Bob and Cindy decide not to cut the cake at all, but to use sealed bids to decide who gets the cake and to compensate the others with money. Assume Ann bids $15, Bob bids $12 and Cindy bids $8. Determine who gets the cake and how much money that person pays the others in compensation.

Answer: Ann takes the cake and puts $15 in the pot. Each person withdraws one third of his or her bid. So Ann takes out $5, Bob takes out $4 and Cindy takes out $3. That leaves $3 in the pot, which is split evenly between them. So Ann gets back $6, Bob gets $6 and Cindy gets $4.


(a) There are six possible assignments of rooms to A, B and C (I also show the points):

```
C  3:24 2:54 3:24 1:22 2:54 1:22
```

(b) There are six columns and the smallest point assignment for each column is in order: 22, 17, 24, 17, 20, 20.

(c) The biggest of these is 24, from column 3, so that is the assignment we use; i.e., A gets room 2, B room 1 and C room 3.

[4] Correct the following errors:

(a) “A recent survey showed that support for the governor's program fell 10%, from 50% to 40%.”

Answer: It should be either “A recent survey showed that support for the governor’s program fell 10 percentage points, from 50% to 40%”, or “A recent survey showed that support for the governor’s program fell 20%, from 50% to 40%.”

(b) “A gallon of gas recently sold for $4.50, three times more than the $1.50 price of a few years ago.”

Answer: It should be either “A gallon of gas recently sold for $4.50, two times more than the $1.50 price of a few years ago” or “A gallon of gas recently sold for $4.50, three times as much as the $1.50 price of a few years ago.”

[5] (Be prepared to make other kinds of charts too.)

(a) Make a double stem and leaf plot using the two data sets given in Problem 4 on page 512.

<table>
<thead>
<tr>
<th>Class 1</th>
<th>Class 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 0 0 2 2 3 4 4 5 6 7 8</td>
<td>3 3 4 4 6 6 6 7 7 0 3 4 4 5 6 7 8</td>
</tr>
<tr>
<td>3 4 6 6</td>
<td>5 4</td>
</tr>
</tbody>
</table>

Answer: Make a single comparison histogram using the two data sets given in Problem 4 on page 512. Choose an appropriate bin length; justify the length you use.

A length of 10 would be reasonable, but there would be only five bins.

A length of 5 shows a bit more detail while still making it easy to see clustering by grouping the data. The data for Class 1 is shown with bars made of x’s (it's hard to create graphical bars in text) and the data for Class 2 by y’s.

```
 y y y
 x y y x
 x y x x y y y
 x x x y x y x y x
```

Answer: These categories overlap, as is made clear by the fact that the percentages add to well over 100%; someone might well have both a job and live off campus. Thus it makes no sense to use pie charts, since the data do not represent parts of a whole. Nor is there any trend; the data may give a profile of the students but it does not involve numbers changing over time, so line graphs are not called for. Histograms are for when you have a list of data values, and you want to show how often the values fall in various ranges. Since we do not just have a list of numbers, we would not use a histogram. Thus the bar chart is best, since it can show our data, while none of the other options is appropriate.


Answer: (a) The graph at first seems to show a rising management health care contribution. The graph also makes it hard to read what the actual percentages are, since the three dimensional effect used occludes the scale.

(b) The actual contributions are about 48%, 48%, 45%, and 42% from 2000 to 2004. Thus the actual percentages are declining whereas the 3D line graph itself is shown with a rising line, which makes the graph misleading.