# Normal Models

HOMEWORK: PG. 131 #25 AND 26

### Homework Solutions

- 1. (a) 72oz and 40 oz. (b) 4.5 lb. and 2.5 lb.
- 3. (a) Skewed to the right because the mean is higher than the median.
  - (b) \$350 and \$950
  - (c) Min= \$350, Mean = \$750, Median = \$550, Range = \$1200, IQR = \$600, Q1 = SD = \$400
  - (d) Min = \$330, Mean = \$770, Median = \$550, Range = \$1320, IQR = \$660, Q1 = \$385,
    - SD = \$440

9.65

#### 10. 140 or above

11. It is less likely to happen in July. In January, a high of 55 is not quite 2 standard deviations above the mean whereas in July a high of 55 is more than 2 standard deviations below the mean.

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12. Math exam; French z = 1.25, Math z = 1.5
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#### Normal Models

- Also called "bell-shaped curves"; show up in Statistics over and over
- Appropriate for distributions whose shapes are unimodal and symmetric
- They provide a measure of how extreme a z-score is
- There is a normal model for every possible mean and standard deviation
- Notation:  $N(\mu,\sigma)$  where  $\mu$  is the mean in the model and  $\sigma$  represents the standard deviation in the model
- In order to use any Normal model, we must assume normality.
- Nearly Normal Condition: The shape of the data's distribution is unimodal and symmetric- check with a histogram or normal probability plot

# Different Measures Produce Different Curves



## Practice:

The Department of Mathematics and Computer Science of Dickinson College gives an exam each fall to freshman who intend to take calculus; scores on the exam are used to determine into which level of calculus a student should be placed. The exam consists of 20 multiple-choice questions. Scores for the 213 students who took the exam in 1992 are tallied in the following table.

| score | 1  | 2          | 3  | 4. | 5  | 6  | 7  | 8  | 9  | 10 |
|-------|----|------------|----|----|----|----|----|----|----|----|
| count | 1  | 1          | 5  | 7  | 12 | 13 | 16 | 15 | 17 | 32 |
| score | 11 | 12         | 13 | 14 | 15 | 16 | 17 | 18 | 19 |    |
| count | 17 | <b>2</b> 1 | 12 | 16 | 8  | 4  | 7  | 5  | 4  |    |



# Empirical Rule



# Practice

### Standard Normal Distribution

- The Normal model with mean = 0 and standard deviation = 1 is called the standard Normal model (or standard Normal distribution).
- We can use the Standard Normal Curve to find proportions that cannot be found using the Empirical Rule.