___ 1. We collect these data from 50 male students. Which variable is categorical?
   A) eye color   B) head circumference   C) hours of homework last week
   D) number of cigarettes smoked daily   E) number of TV sets at home

___ 2. Which of those variables is most likely to be bimodal?

___ 3. Which of those variables is most likely to follow a Normal model?

___ 4. The mean number of hours worked for the 30 males was 6, and for the 20 females was 9.
   The overall mean number of hours worked ...
   A) is 6.5   B) is 7.2   C) is 7.5   D) is none of these.   E) cannot be determined.

___ 5. We might choose to display data with a stemplot rather than a boxplot because a stemplot
   I.   reveals the shape of the distribution.
   II. is better for large data sets.
   III. displays the actual data.
   A) I only   B) II only   C) III only   D) I and III   E) I, II, and III

___ 6. Which is true of the data whose distribution is shown?
   I.   The distribution is skewed to the right.
   II. The mean is probably smaller than the median.
   III. We should summarize with mean and standard deviation.
   A) I only   B) II only   C) I and II   D) II and III   E) I, II, and III

___ 7. The standard deviation of the data displayed in
   this dotplot is most likely to be ...

   A) 5.   B) 8.   C) 12.   D) 18.   E) 20.

___ 8. Suppose that a Normal model describes the
   acidity (pH) of rainwater, and that water tested
   after last week's storm had a z–score of 1.8.
   This means that the acidity of that rain ...
   A) had a pH of 1.8.
   B) varied with a standard deviation of 1.8
   C) had a pH 1.8 higher than average
      rainfall.
   D) had a pH 1.8 times that of average
      rainwater.
   E) had a pH 1.8 standard deviations
      higher than that of average rainwater.

___ 9. The ages of people attending the opening
   show of a new movie are summarized in
   the ogive shown. Estimate the IQR of the
   ages.
   A) 5   B) 13   C) 21   D) 30   E) 37

___ 10. Environmental researchers have collected rain acidity data for several decades. They want
   to see if there is any evidence that attempts to reduce industrial pollution have produced a
   trend toward less acidic rainfall. They should display their data in a(n)...
   A) contingency table   B) bar graph   C) boxplot   D) histogram   E) timeplot
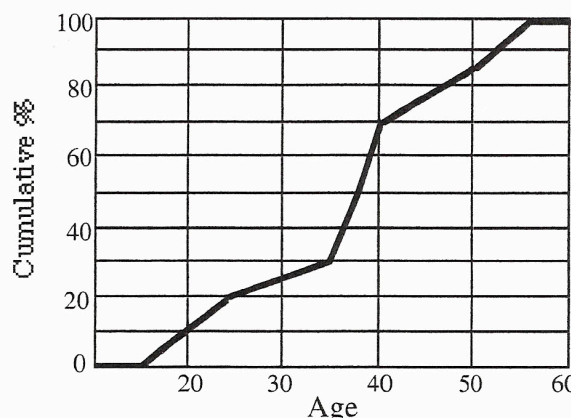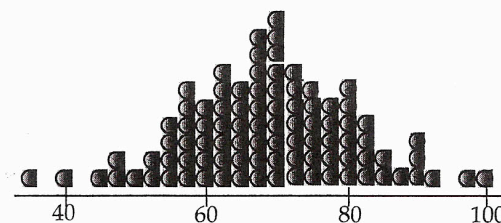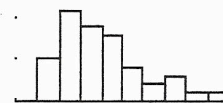
11. **Paying for purchases** One day a store tracked the way shoppers paid for their purchases. Their data are summarized in the table.

	Cash	Check	Charge	Total
Male	18	10	12	40
Female	18	12	30	60
Total	36	22	42	100

    a. What percent of the men paid cash? _____

    b. What is the conditional relative frequency distribution of payment method for women?

    c. If you wanted to show the association between gender and method of payment visually, what kind of graph would you make? (Just name it.)

    _____

    d. Is there evidence of an association between gender and method of payment? Explain briefly.

12. **Repair bills** An automobile service shop reported the summary statistics shown for repair bills (in $) for their customers last month.

    a. Were any of the bills outliers? Show how you made your decision.

Min	27
Q1	88
Median	132
Q3	308
Max	1442
Mean	284
SD	140

    b. After checking out a problem with your car the service manager gives you an estimate of "*only* $90." Is he right to imply that your bill will be unusually low? Explain briefly.

13. **Salary conversions** You learn that your company is sending you and several other employees to staff a new office in China. While there everyone will earn the equivalent of their current salary, converted to Chinese currency at the rate of 8 yuans per dollar. In addition, everyone will earn a weekly foreign living allowance of 200 yuans. For example, since you are earning $1000 per week, your weekly salary in China will be $1000 \times 8 + 200 = 8200$ yuans.

    a. Shown are some summary statistics describing the current salaries of this group being sent overseas. Fill in the table to show what these statistics will be for the salaries you all will earn while in China.

Statistic	In the US	In China
Minimum salary	$400	
Standard deviation	$250	
Median	$750	
IQR	$300	

    b. Among this group of employees going to China, your US salary has a z–score of +1.20. What will your new z-score be, based on everyone's China salary?

    _____

14. **Copy machines** A manufacturer claims that lifespans for their copy machines (in months) can be described by a Normal model $N(42,7)$. Show your work.

  a. Draw and clearly label the model.
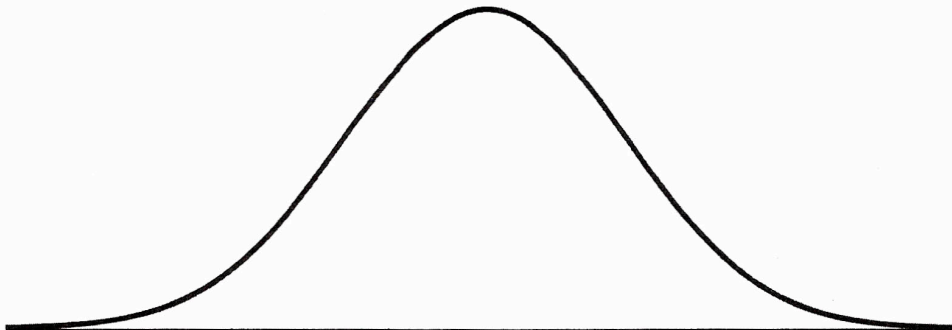
  b. A company with a several large office buildings buys 200 of these copiers. The salesman tells the boss "190 (95%) of your new copiers will last between _____ and _____ months." Comment on this claim.

  c. What is the 3rd quartile of copier lifespans?

    _____

  d. What percent of the copiers are expected to fail before 36 months?

    _____

  e. The manufacturer wants to reduce the 36-month failure rate to only 10%. Assuming the mean lifespan will stay the same, what standard deviation must they achieve?

    _____

  f. Briefly explain what that change in standard deviation means in this context.

  g. A competing manufacturer says that not only will 90% of their copiers last at least 36 months, 65% will last at least 42 months. What Normal model parameters is that manufacturer claiming? Show your work.

    $N($ _____ , _____ $)$

1. A   2. D   3. B   4. B   5. D   6. A   7. C   8. E   9. B   10. E

11. Paying for purchases

   a.   45%

   b.   30% cash, 20% check, 50% charge

   c.   segmented bar graphs, or pie charts

   d.   Yes. Women are more likely to charge their purchases than men (50% to 30%) and less likely to pay cash (30% to 45%).
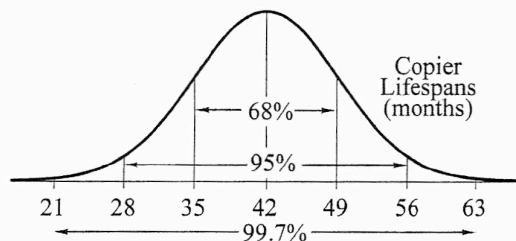
12. Repair bills

   a.   Yes. IQR = 308 – 88 = 220. The upper fence for outliers is one and a half IQR's above the third quartile, or 308 + 1.5(220) = 638. The maximum repair bill was $1442, well above $638, so it is certainly an outlier.

   b.   No. $90 is higher than over 25% of the bills, so it is not unusually low.

13. Salary conversions

   a.   3400 yuans, 2000, 6200, 2400   b. $z = +1.20$

14. Copy machines

   a.

   b.   28, 56. The claim is probably false. This model should provide a useful estimate of what might happen, but is not certain to predict what actually will happen.

   c.   46.7 months

   d.   19.6%

   e.   4.7 months (should all include sketches of labeled curves)

   f.   A smaller standard deviation means that the copiers would be more consistent in their lifespans

   g.   For 36 months $z = -1.28$ and for 42 months $z = -0.385$. Thus the difference of 6 months is 1.28 - 0.385 = 0.895 standard deviations. The model is N(44.6, 6.7)