

## chapter 3

### Problems For You To Do: (Sections ~~2.4, 2.5, 2.6, 2.7~~ 3.2, 3.3, 3.4)

1. A sample of apartment sale prices gave the following prices (in thousands of \$): 112, 119, 157, 215, 308, 320, 350, 580
  - a) Use your calculator to determine
    - i) the mean sale price.
    - ii) the standard deviation of the sale prices.
  - b) Calculate the third quartile,  $Q_3$ , of the sale prices.
  - c) Calculate the 30<sup>th</sup> percentile,  $P_{30}$ , of the sale prices.
2. The Math 101 Statistics Survey yielded the following sample data:

No. of Cups of Coffee Drunk	No. of Students
0	24
1	9
2	4
3	1
4	0
5	1
6	1

Calculate for the amount of coffee drunk:

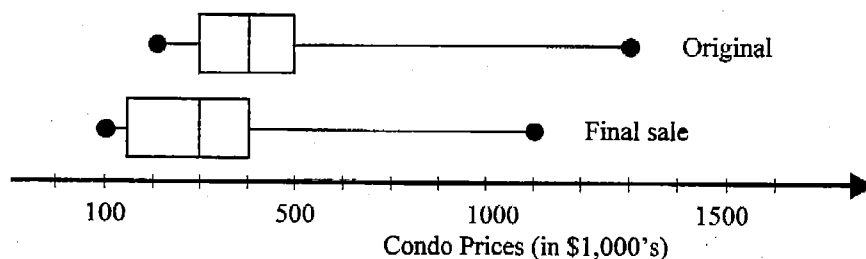
- a) the mean
  - b) the median
  - c) the standard deviation
3. The Math 101 Statistics Survey yielded the following frequency table for the number of hours slept the previous night:

Hours Slept	No. of Students
1.5 - 3.5	2
4 - 6	8
6.5 - 8.5	27
9 - 11	3

For this sample of students, calculate the following (approximately): (Remember Units!)

- a) mean sleep time
- b) variance of the sleep times

4. The boxplots below show the distribution of the *original* and the *final* sale prices of a sample of condominium prices.



- a) What is the median *original price*?
- b) 75% of the condominiums were *more expensive* than what *final price*?
- c) Give a “rough estimate” of the standard deviation of the *original prices*. Indicate your method.
5. Your test score of 14 represents what *standard score*, if the class mean and standard deviation are 16.5 and 2, respectively?
6. Find the *median* asking price for the following list of 1984 import car prices (in \$):  
4200 4800 1800 9850 2200 1200 2600 1100 1000 1800  
Remember to include units in your answer.

7. The table to the right gives the numbers of goals scored by 6 Canuck defensemen (as of halfway through the 1999 – 2000 season). Find

Name	# of goals ( $x$ )
Aucoin	11
McCabe	4
Ohlund	6
Baron	0
Murzyn	0
Jovanovski	3

- a) the mean numbers of goals scored
- b) the values of each of the following sums (no units required)
- $\Sigma x^2$
  - $(\Sigma x)^2$
  - $\Sigma(x - \bar{x})$
- c) the sample standard deviation of the numbers of goals scored.

8. A sample of 50 cars arriving at the college produced the frequency table to the right.

# of passengers	Frequency
$x$	$f$
0	18
1	15
2	9
3	6
4	2
	50

- Find the
- a) modal number of passengers per vehicle
- b) median number of passengers per vehicle
- c) mean number of passengers per vehicle
- d) standard deviation of the number of passengers per vehicle. (You do not have to show work, but if you don't, your answers will be graded right or wrong, i.e. no partial credit.)
9. “Guesstimate” the standard deviation of the hours of sleep last night for students in this class. Indicate the method that you are using to obtain this “guesstimate”.

# Company Car Sale

1999 & 2000 Executive Driven Vehicles

1 Day • 1 Location

Saturday, January 29<sup>th</sup>, 10 am - 5 pm

	MSRP (including freight & PDI)	NOW!
• 1999 C230WS -- *14006 Azure Blue/Black Leather	\$50,025	\$42,500
• 1999 ML320E -- *12640 Glacier White/Parchment Leather	\$55,310	\$46,800
• 1999 SLK230 -- *15422 Obsidian Black/Black Leather	\$59,735	\$47,000
• 1999 C280WS -- *13024 Obsidian Black/Grey Leather	\$56,320	\$47,600
• 1999 C280W -- *14334 Brilliant Silver/Grey Lex	\$54,880	\$47,900
• 1999 ML320E -- *12346 Brilliant Silver/Grey Leather	\$55,310	\$49,900
• 1999 ML430E -- *10104 Black Opal/Grey Leather	\$61,760	\$53,500
• 1999 CLK320 -- *14323 Brilliant Silver/Charcoal Leather	\$66,375	\$56,000
• 1999 E320W -- *13480 Aspen Green/Parchment Leather	\$68,445	\$59,000
• 1999 C43 -- *14064 Brilliant Silver/Black & Ash Leather	\$79,505	\$62,000
• 1999 E430W -- *13886 Black Opal/Grey Leather	\$79,215	\$63,800
• 1999 E430W -- *13722 Smoke Silver/Parchment Leather	\$75,945	\$63,800
• 1999 SL500R -- *14402 Black/Black Leather	\$118,930	\$102,800



Mercedes-Benz

Source: The Vancouver Sun, p. F7, 2000-01-28

10. a) Identify and calculate the five numbers required to construct a boxplot for the sale prices (last column) of the listed cars.

- b) Draw a box plot (Box & Whisker diagram) for the sale prices. Label the axis clearly. Indicate the scale by identifying the "tick marks".
- c) What is the interquartile range of the sale prices?
- d) 25% of the cars cost at least how much?

11. Which of the following two language-facility test scores has a better relative position as measured by its z-score?

- a) A score of 65 on a test for which  $\bar{x} = 70$  and  $s = 10$ , or
- b) A score of 455 on a test for which  $\bar{x} = 500$  and  $s = 80$ .

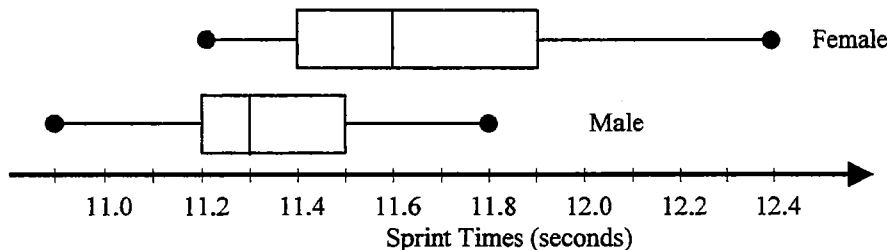
12. For the 100 meters race times to the right, what is the

- a) 70<sup>th</sup> percentile? (units)
- b) first quartile? (units)

### Top 10 Times (sec) for Women's 100 Meter

10.49	Florence Griffith Joyner (USA) '88
10.65	Marion Jones (USA) '98
10.73	Christine Arron (FRA) '98
10.74	Merlene Otsoy (JAM) '96
10.76	Evelyn Ashford (USA) '84
10.77	Irina Privalova (RUS) '94
10.78	Dawn Sowell (USA) '89
10.79	Li Xuemei (CHN) '97
10.81	Marlies Gohr (GDR) '83
10.82	Gail Devers (USA) '92

13. The box plots drawn below show the distribution of the 100 m sprint times for a sample of female and male athletes.



- a) What is the median sprint time for the female athletes? (Don't forget units!)
- b) Three quarters of the males in the sample ran faster than what time?

14. For the 12 inflation rates in the table (expressed in %) find the
- mean inflation rate
  - median inflation rate
  - standard deviation of the inflation rates

SUN, SATURDAY, SEPTEMBER 18, 1999

## Inflation Rate

Here's what happened  
In the provinces

Newfoundland	1.7
Prince Edward Island	1.6
Nova Scotia	2.3
New Brunswick	2.3
Quebec	1.8
Ontario	2.5
Manitoba	2.1
Saskatchewan	2.0
Alberta	2.6
British Columbia	1.3
Whitehorse	1.3
Yellowknife	1.3

15. Find the mean, median, mode and standard deviation of the number of cups of coffee consumed per student based on the sample of 60 students.

# of cups of coffee	# of students
0	20
1	15
2	10
3	8
4	7
	60

16. The frequency table to the right gives the age distribution of a sample of 40 students. Use this table to calculate (approx.)
- the mean age of the 40 students
  - the variance of the ages
  - the standard deviation of the ages

Age (years)	Frequency
17 - 19	10
20 - 22	15
23 - 25	10
26 - 28	5
	40

17. What symbol (besides SD or sd) is commonly used in statistics to represent a *population* standard deviation?
18. The *mean* measures the central tendency (middle) of a data set in what sense?
19. Petra wouldn't say what her mean time was for a sample of 3 runs up the Grouse Grind, but she did say that one of her times was 8 minutes above the mean and the other two were each 4 minutes below the mean. What is the standard deviation of the times for her 3 runs?
20. In a class test,  $\bar{x} = 62$  and  $s = 6$ .
- Chebyshev says that at least  $\frac{3}{4}$  of the data values on this test lie between what 2 values?
  - Use the Range Rule of Thumb to approximate the minimum and maximum scores.
  - If you scored 80 on this test, what is your z-score? Is this considered an "unusual" score? Justify your answer.

21. a) Determine the following for the data set: 7, 9, 10, 4, 15, 10, 13, 7, 6  
 mean, median, mode,  $Q_1$  (show your work; use the method described in your notes)  
 b) Assuming this is **sample** data, find the standard deviation using your calculator.  
 (i.e. no formulas needed)
22. For the **sample** data: 6, 3, 7, 4, 5  
 a) Find mean deviation (show your calculations).  
 b) Find the variance using the defining formula (state the formula; show all key steps in the calculation).  
 c) Find the standard deviation (show formula and calculations).

23. The ages of the first 11 customers entering a Tim Horton's restaurant during a particular hour of the week are summarized in the table to the right.

Age (in years)	No. of customers
10 - 14	2
15 - 19	1
20 - 24	3
25 - 29	5

- a) Class width?  
 b)  $\bar{x} = ?$   
 c) Briefly explain why the calculation for  $\bar{x}$  does not necessarily give the correct value for the mean age of the 11 customers.  
 d) Calculate the sample standard deviation using the definitional formula. State the formula, and show the substitution of the numbers into the formula.

24. A **sample** of house prices is shown.

**RECENT MLS SALES - OCTOBER 1, 1999 TO JANUARY 14, 2000**

Give all answers to the nearest \$.

- a) For the selling price, use your calculator to determine  
 i) the mean price  
 ii) the standard deviation for the prices

ADDRESS	ASK PRICE	SELL PRICE	SELLING DATE	NO. OF BEDRMS	NO. SQ.
4327 W 11TH AV	369,000	357,000	Oct 20/99	4	2016
3703 W 20TH AV	368,800	360,000	Nov 2/99	3	1600
3864 W 17TH AV	390,000	372,500	Nov 27/99	5	2420
4078 W 17TH AV	389,000	380,000	Oct 1/99	5	1590
3983 W 20TH AV	389,000	380,000	Dec 8/99	4	1771
3836 W 19TH AV	399,900	382,000	Nov 30/99	2	1796
3715 W 22ND AV	419,000	398,000	Jan 6/00	3	1500
4593 W 11TH AV	408,000	400,000	Jan 2/00	4	2400
2600 WALLACE ST	435,000	410,000	Nov 25/99	5	2424
4479 W 5TH AV	435,000	422,500	Dec 24/99	3	1600
3728 W 19TH AV	439,000	423,000	Nov 18/99	3	2170
3792 W BROADWAY	438,000	438,000	Oct 1/99	6	2470

MEMO  
 Don't forget  
 units

- b) Calculate the first quartile,  $Q_1$  of the selling prices.  
 c) Calculate the 70<sup>th</sup> percentile of the selling prices.  
 d) The above list includes only the 12 houses with the *lowest* selling prices. The rest of the flier included an additional 60 houses, the most expensive one of which sold for \$2,388,888. Estimate the standard deviation of the complete list of 72 houses, and show how you arrived at the estimate.

25. The number of *bedrooms* in the 72 houses in the complete list in the flier from Question 24 is summarized in the table shown.

# of bedrooms	# of houses
2	2
3	18
4	16
5	28
6	8

- a) What is the modal number of bedrooms?  
 b) What is the median number of bedrooms?  
 c) What is the mean number of bedrooms?

26. After the first round of the recent Bob Hope Golf tournament, the 30 best (i.e. lowest) scores are summarized below:

Score (strokes)	No. of Scores
63	1
64	4
65	6
66	11
67	8
<b>Totals:</b>	<b>30</b>

Calculate the following:

- the mean score
- the median score
- the standard deviation of the sample of 30 scores
- the sum of the squares of all 30 scores
- the sum of the squares of the deviations of the scores from the mean

### GOLF SCORES

BOB HOPE CHRYSLER CLASSIC	
BERMUDA DUNES, Gulf (AP) - Leading scores Wednesday from the first round of the \$3-million Bob Hope Chrysler Classic played on the 6,829 yard, par 35-36-71 Bermuda Dunes Golf Course, the 6,478 yard, par 36-36-72 Indian Wells Golf Course, the 7,060 yard, par 36-36-72 La Quinta Golf Course and the 6,980 yard, par 36-36-72 PGA West Arnold Palmer Private Course:	
Andrew Magee	32-34-66
Stephen Ames	32-34-66
Brian Henninger	31-35-66
Jim Carter	32-34-66
Matt Gogel	33-33-66
Bill Glasson	31-35-66
Franklin Langham	31-35-66
John Maginnis	32-35-67
Kevin Wentworth	32-35-67
Robin Freeman	35-37-67
Frank Nobilo	34-33-67
Tom Pernice Jr.	34-33-67
David Peoples	33-34-67
Bob Heintz	33-34-67
Russ Cochran	32-32-67
David Touss	31-32-63
Neal Lancaster	32-32-64
Robert Jamron	33-31-64
Bob Twxy	31-33-64
Paul Goydos	35-29-64
Glen Day	33-32-65
Steve Pate	33-32-65
Esteban Toledo	31-34-65
J.L. Lewis	33-32-65
Olin Browne	33-32-65
Greg Kraft	30-35-65
Davis Love III	35-31-66
Jerry Kelly	32-34-66
Rocco Mediate	31-35-66
Bradley Hughes	34-32-66

27. When the midterm exams were returned, the instructor announced that the class of 45 had a mean score of 72% and a standard deviation of 12%. Eric, who had a score of 88%, asked Andrea how she did. Andrea would only reveal that her standard score was 1.5. Who did better on the exam? Explain.

28. For the Canucks top ten players in the points standings, as of Feb. 6, 2002, find the

### CANUCKS LEADERS

Player	Gp	G	A	Pts	+/-	Pim
Markus Naslund	57	26	33	59	12	42
Todd Bertuzzi	47	17	28	45	6	74
Brendan Morrison	57	15	29	44	9	18
Andrew Cassels	37	5	27	32	3	16
Ed Jovanovski	57	14	15	29	7-	72
Trevor Linden	55	10	17	27	1-	35
Mattias Ohlund	56	7	19	26	12	44
Jan Hlavac	52	12	12	24	13	14
Matt Cooke	57	11	13	24	5	72
Henrik Sedin	57	9	13	22	3	28

- mean number of goals scored (G)
- median number of goals scored
- standard deviation of the number of goals scored

29. For the Canucks data in Question 28 which one of the columns, Gp, G, A, Pts., +/-, Pim, would have the largest numerical value for the standard deviation? You do *not* have to do any calculations, but you must briefly justify your answer.

30. If on your first 7 quizzes you averaged 15 points and you got 11 points on your 8<sup>th</sup> quiz, what is your average score for the 8 quizzes?

31. Find the mean, median, mode and standard deviation of the number of credit cards owned per person in a random sample of 40 shoppers.

(For the mean and standard deviation state the formulas and show the substitution of the appropriate numbers into the formula.)

# of credit cards	# of shoppers
0	5
1	13
2	12
3	10
	40

32. "Guesstimate" the standard deviation of the quiz scores (out of 20 points) for your Math 101 class. Indicate the method that you are using to obtain this guesstimate.

33. The frequency table to the right gives the distribution of the number of TV hours watched per week for a sample of 25 children. Use your calculator to calculate an approximate value for the
- mean number of hours of TV watched per week per child
  - standard deviation of the number of hours of TV watched per week per child

TV Hours	# of children
0 - 4	3
5 - 9	7
10 - 14	9
15 - 19	4
20 - 24	2
	25

34. a) For the asking prices for dogs shown to the right, determine:

- the mean asking price
- the median asking price
- the mode asking price
- the mid-range asking price

b) If the 3<sup>rd</sup> price down (\$800) is replaced by the "upper value" quoted in the ad (\$1000), which of the above 4 measures of central tendency will be affected the most? Support your answer with numbers!!

Dogs	297
LOVELY puppies, of PB German Shepherd & champ blood. Both parents CKC cert. 1st shots. 7 wks old, ready to go. \$850 obo. To see, call 241-1859/728-2815	\$650
GERMAN SHEP. PUPS, reg'd Germ/Czech line & 2 M. young adults. \$500/up. 604-826-2340	\$500
★ German Shepherd from exceptional European blood lines. \$800-\$1000 56-8161	\$800
GERMAN SHEPHERD PUPS Reg'd., Czech/German lines, tattoo, guar. \$500. & up. 826-2340	\$500
GERMAN SHEP. pups, reg'd. Superior show & work. From \$850. Lifetime guar. 944-40-57	\$850
REG'D German Shep. pups from select Can/Amr. champ. lines. OFA H & E. \$500/up. 825-9819	\$500
GERMAN SHEPHERD pups fr TT, OFA hips, reg'd stock. Shots & worming. \$350. 826-6345	\$350
GERMAN SHEP pups born July 6, 1 blk fem, 1 male beaut markings. \$250/each. 532-9440.	\$250
YELLOW LAB PUPS Priv home, shots wormed, dew claws, vet checked. Exc. choice To go Sept 21. \$540. 886-7765	\$540
CKC reg'd Yellow Labs. Home enviro., excap. dispo. Sept. \$57 604-785-3093/uni@dowco.c	\$650
★QUALITY LAB PUPS★ Ch. Reg. Exc. family/hunting dogs. Home-raised. Yellow \$550. Black \$500. 230-573-3536. Kamloops.	\$550
BOUNCING BEAUT. blk Labs. 2 boys & 2 girls, P/B reg'd. shots, dewormed. 8 wk old. \$550, ready to go. Bowen ls. 604-947-9417	\$550

35. For the 15 "Super Saver" rates find the

- 60<sup>th</sup> percentile
- 35<sup>th</sup> percentile



Rates quoted in U.S. funds.	Popular Rate	Super Saver
Marqueen Hotel	\$139	\$ 89
Mayflower Park Hotel	\$160	\$105
Pacific Plaza Hotel	\$118	\$ 65
Paramount, a WestCoast Hotel	\$210	\$104
Ramada Inn Downtown Seattle	\$145	\$ 79
Renaissance Madison	\$240	\$119
Roosevelt Hotel	\$190	\$ 95
Seattle Inn	\$105	\$ 55
Sheraton Seattle Hotel	\$250	\$129
Silver Cloud Inn Lake Union	\$140	\$ 89
Sixth Avenue Inn	\$139	\$ 69
Sorrento Hotel.	\$220	\$139
Summerfield Suites	\$240	\$119
Travelodge by The Space Needle	\$109	\$ 55
W Seattle	\$290	\$145

36. Full-term human birth weights have a mean of about 2.5 kg and a standard deviation of about 0.5 kg. What is the z-score (standard unit value) of a birth weight of 1.2 kg?

37. a) Using the method developed in class, give the 5-number summary (identify each number) and construct a box plot (fully labeled and scaled) for the Points (Pts) data for the 25 Vancouver Canucks that had at least one point in the 2001/02 season.

- b) Which word(s) best describe(s) the shape of the distribution of the points?  
 skewed left, skewed right, symmetric, uniform
- c) Without doing any calculations, would you expect the mean number of points to be less than, greater than, or about the same as, the median number of points?

**FINAL CANUCKS LEADERS 2001/02 SEASON**

Player	Gp	G	A	Pts	+/-	Pim
Markus Naslund	81	40	50	90	22	50
Todd Bertuzzi	72	36	49	85	21	110
Brendan Morrison	82	23	44	67	18	26
Andrew Cassels	53	11	39	50	5	22
Ed Jovanovski	82	17	31	48	7-	101
Trevor Linden	80	13	24	37	5-	71
Henrik Sedin	82	16	20	36	9	36
Mattias Ohlund	81	10	26	36	16	56
Matt Cooke	82	13	20	33	4	111
Daniel Sedin	79	9	23	32	1	32
Jan Hlavac	77	16	15	31	9	18
Trevor Letowski	75	9	16	25	4	19
Brent Sopel	66	8	17	25	21	44
Klatt RES	34	8	7	15	9	10
Scott Lachance	81	1	10	11	15	50
Bryan Helmer	40	5	5	10	10	53
Artem Chubarov	51	5	5	10	3-	10
Todd Warriner	32	2	7	9	1	20
Jarkko Ruutu	49	2	7	9	1-	74
Druken MNR	27	4	4	8	1-	6
Kurtz MNR	27	3	5	8	4-	14
Murray Baron	61	1	6	7	8	68
Jason Strudwick	44	2	4	6	4	96
Vasilijevs MNR	18	3	2	5	0	2
Kariya MNR	3	0	1	1	2-	2

38. In a one-month period, the following employee absenteeism was recorded:

# Days Absent	# Employees
0	12
1	2
2	3
3	2
4	1

- a) Determine the total number of days lost due to employee absenteeism.
- b) Determine the Mean number of days absent.
- c) Determine the Median number of days absent.

39. The marks achieved by a sample of 10 students on a quiz (marked out of 25) were as follows: 13 10 17 20 22 9 25 14 22 13

- a) Determine the following:
- Mean
  - Median
  - Mode
  - the standard deviation
  - the Quartiles,  $Q_1$  and  $Q_3$
- b) Sketch a Box & Whisker Plot for the data.

40. Results from a college entrance exam (out of 450 marks) indicate a mean score of 370 and a standard deviation of 19.

- a) According to Chebyshev, at least \_\_\_\_\_% of the scores were between 331 and 408.
- b) A score higher than \_\_\_\_\_ would be considered unusual.



41. Annual family incomes (in thousands of dollars) for 30 rural families is given by the following table:

Family Income	# of Families
21 – 25	2
26 – 30	5
31 – 35	20
36 – 40	3

- a) For the family incomes, estimate the
- range
  - midrange
- b) Use the class marks to calculate the
- mean family income
  - sample standard deviation of family incomes
- c) Which one(s) of the numbers calculated in (a) and (b) are measures of variation?

Remember to state units!

42. a) For the *weekly gross* figures to the right, what is the

i) 80<sup>th</sup> percentile

ii) first quartile?

- b) What is the third quartile of the *total gross*?

May 30 - June 5 Vancouver Sun 2002

Top 10 movies					
North America's top 10 movies Friday through Sunday, compiled by Entertainment Data Inc. and Exhibitor Relations Co.					
	Weekly gross (\$ millions)	Total gross (\$ millions)	Weeks in release	Rank last week	Rank in Canada
1. Star Wars: Episode II	\$60	\$201.3	1	—	—
2. Spider-Man	\$35.8	\$333.6	3	1	—
3. Isomnia	\$26.1	\$26.1	2	2	—
4. Spirit: Stallion	\$23.2	\$23.2	1	—	—
5. Enough	\$17.2	\$17.2	1	—	—
6. About a Boy	\$9.8	\$21.8	2	3	—
7. Unfaithful	\$7.6	\$41	3	3	—
8. The New Guy	\$5.4	\$24.4	3	5	—
9. Changing Lanes	\$1.9	\$64.4	6	6	—
10. The Scorpion King	\$11.8	\$87.9	6	7	—

43. The idealized histogram to the right approximates the distribution of human birth weights. If the distribution has a mean birth weight of 3.4 kg. and a standard deviation of 0.5 kg., approximately what percentage of the birth weights are between 2.4 and 4.4 kg?



44. Which of the following two college admission test scores has a better relative position as measured by its z-score?
- a) A score of 227 on a test for which  $\bar{x} = 180$  and  $s = 35$ .
- or
- b) A score of 418 on a test for which  $\bar{x} = 350$  and  $s = 50$ .

45. For the running shoe prices to the right calculate the

- a) 40<sup>th</sup> percentile
- b) 65<sup>th</sup> percentile

## Footwear

### RUNNING/X TRAINING

Saucony Grid Stabil	\$139.99
Saucony Grid Control	\$109.99
Saucony Grid Azura	\$109.99
Reebok DMX-6	\$139.99
Reebok DMX-10	\$169.99
Nike Air Prooke	\$109.99
Asic Gel MC 126	\$119.99
Asic GT 2030	\$139.99
Avia 2074	\$99.99
Head C-Tech X-Trainer	\$119.99

46. Give the 5-number summary and construct a box plot for the home run data for the 33 career leaders.

Identify each number and use the percentile calculation method developed in class.

### CAREER HOME RUN LEADERS Through June 6, 2002

Player	No.
1. Hank Aaron	755
2. Babe Ruth	714
3. Willie Mays	660
4. x Barry Bonds	587
5. Frank Robinson	586
6. Mark McGuire	583
7. Harmon Killebrew	573
8. Reggie Jackson	563
9. Mike Schmidt	548
10. Mickey Mantle	536
11. Jimmie Fox	534
12. Willie McCovey	521
13. Ted Williams	521
14. Eddie Mathews	512
15. Ernie Banks	512
16. Mel Ott	511
17. Eddie Murray	504
18. Lou Gehrig	493
19. Willie Stargell	475
20. Stan Musial	475
21. x Sammy Sosa	470
22. Dave Winfield	465
23. Jose Canseco	462
24. x Ken Griffey Jr.	461
25. x Rafael Palmiero	458
26. x Fred McGriff	457
27. Carl Yastrzemski	452
28. Dave Kingman	442
29. Andre Dawson	438
30. Cal Riken Jr.	431
31. Billy Williams	426
32. Darrell Evans	414
33. Duke Snider	407

47. a) Five students calculated the average monthly cost of their cellular phone service. It was noted that Patricia's bill was \$11.50 above the average, Sarah's was \$3.35 below the average, Mimi's was \$5.20 below the average, and Kenneth's was \$1.10 above the average. Was the cost for the fifth student, Jason, above or below the average cost, and by how much?
- b) If this group of students is considered to be a sample of college students, calculate the standard deviation of the 5 monthly costs.

48. The table to the right gives the deviations from the mean for 4 measurements in a sample of 5 measurements.

$x - \bar{x}$
-2
5
-7
-4
□

a) What is the value of the missing deviation? →

b) What is the *variance* of this sample?

49. The table to the right summarizes the responses of a sample of 50 students to the question "How active is your lifestyle?"

Response	Frequency
Not at All	4
Not Very	19
Somewhat	15
Very	12
	50

Find the

- a) modal response
- b) median response

50. You have written 11 statistics quizzes and have an average of 14 points on them. Your instructor generously agrees to delete your worst quiz and base your quiz grade on the remaining 10 quizzes. If your worst quiz score is 8 points, what is the average of your other 10 quizzes?

51. Find the mean, median, mode and standard deviation of the number of passengers per car for a sample of 25 cars arriving at the college. State the formulas and show the substitution of the appropriate numbers into the formulas.

Number of Passengers	Number of Cars
0	11
1	8
2	4
3	2
	25

52. The frequency table to the right gives the distribution of the sprint times for a sample of 30 female athletes. Use your calculator to calculate an approximate value for the

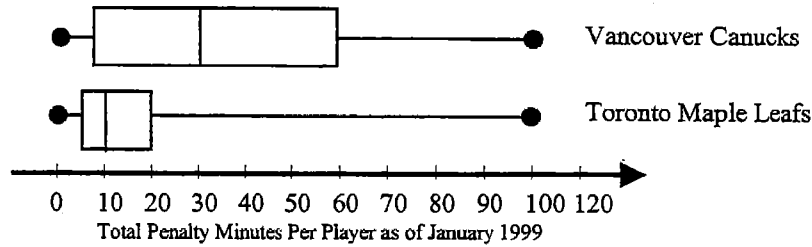
Sprint time (seconds)	Number of athletes
10.5 – 10.9	5
11.0 – 11.4	8
11.5 – 11.9	10
12.0 – 12.4	7
	30

- a) mean of the 30 sprint times
- b) standard deviation of the 30 sprint times

53. The ages (in years) of a sample of 10 students in a mathematics class were as follows: 17, 22, 18, 23, 25, 18, 19, 20, 22, 24. Determine the following:

- a) mean
- b) median
- c) mode
- d) standard deviation
- e) variance
- f) interquartile range
- g) range
- h) sketch a box plot for this data; label and scale the axis appropriately.

54. Results from a business survey of college graduates indicate a mean salary of \$57,600 with a standard deviation of \$3,300.
- According to Chebyshev, at least  $\frac{8}{9}$  of the salaries lie between what 2 values?
  - Is a salary of \$48,000 considered unusual? Justify your answer.
55. The box plots below the distribution of penalty minutes for the Canuck and Maple Leaf hockey teams.



- Fifty percent of the Maple Leaf players have *at most* \_\_\_\_\_ penalty minutes.
  - Twenty five percent of the Canucks have *at least* \_\_\_\_\_ penalty minutes.
  - Would the standard deviation of penalty minutes for each team be about the same, or would one team have a higher standard deviation? Briefly explain your answer.
56. The frequency table to the right summarizes the number of courses taken by each student in a sample of 40 students.

# courses taken	# of students
1	9
2	11
3	12
4	5
5	3
	40

- Find the mean, median and modal number of courses taken per student.
- Find the standard deviation of the numbers of courses taken per student.

57. For the 15 "Regular Rates" find the

- 80<sup>th</sup> percentile
- 30<sup>th</sup> percentile

## Save Up To 50% On Hotel Rates.

	Regular Rate	Special Rate
Marqueen Hotel	\$139	\$ 89
Mayflower Park Hotel	\$160	\$105
Pacific Plaza Hotel	\$118	\$ 65
Paramount, a WestCoast Hotel	\$210	\$104
Ramada Inn Downtown Seattle	\$145	\$ 79
Renaissance Madison	\$240	\$119
Roosevelt Hotel	\$190	\$ 96
Seattle Inn	\$105	\$ 55
Sheraton Seattle Hotel	\$250	\$129
Silver Cloud Inn Lake Union	\$140	\$ 89
Sixth Avenue Inn	\$139	\$ 69
Sorrento Hotel	\$220	\$139
Summerfield Suites	\$240	\$119
Travelodge by The Space Needle N Seattle	\$109	\$ 55
	\$299	\$145



58. Full-term human birth weights have a mean of about 2.5 kg and a standard deviation of about 0.5 kg.
- A birth weight with a z-score of  $-1.4$  corresponds to what actual weight?
  - Would the above weight be considered “unusual”? Explain.