Question 1: Multiple choice: circle the best answer to each question:

(1)[2 points] The following table gives data for population and number of fatal motor vehicle accidents for Canada's four largest provinces for the year 2000:

Province	Population (millions)	Number of Fatalities
British Columbia	4.1	421
Alberta	3.0	364
Ontario	11.7	849
Quebec	7.4	765

Which province has the lowest motor vehicle fatality rate per 100,000 residents?

(a) British Columbia

(b) Alberta

(c) Ontario

(d) Quebec

(e) There is not enough information to determine the answer.

(2)[2 points] A person steps on the bathroom scale five times in succession and takes the mean of the resulting readings. By using the mean as the final measure of weight,

(a) bias in the measurements will be reduced, but not the random error.

(b) random error in the measurements will be reduced, but not bias.

(c) both random error and bias will be reduced.

(d) neither random error nor bias will be reduced.

(e) the total of bias plus random error should be zero.

(3)[2 points] A measure can be valid yet the measurement

(a) reliable.

(b) biased.

(c) unbiased

(d) ~~all~~ of the above. Any

(e) none of the above.

* NOTE CHANGE

(4)[2 points] the following table summarizes the British Columbia median total family income for years 2001 through 2005:

Year	Median total family income ($)
2000	50,900
2001	51,700
2002	52,800
2003	53,600
2004	55,900
2005	58,500

The greatest percentage increase in median total family income occurred for years

(a) 2000 – 2001

(b) 2001 – 2002

(c) 2002 – 2003

(d) 2003 – 2004

(e) 2004 – 2005

(5)[2 points] The question "Would you like to see more math courses offered at Malaspina" was asked in a recent survey of 650 male and 550 female students. The survey reached the following conclusion: 30% of male and 50% of female students answered "yes", for a total of 80% of students wishing to see more math courses offered. The total of 80% is incorrect; what is the correct percentage of students wishing to see more math courses offered (round to nearest percent)?

(a) 39%

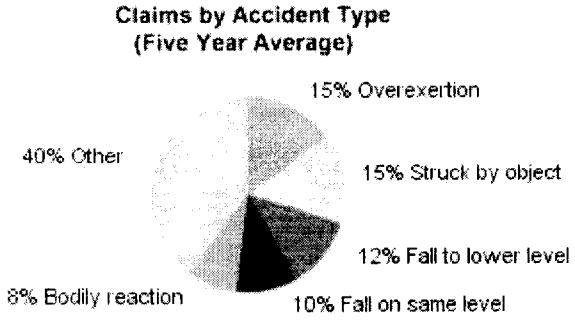
(b) 29%

(c) 40%

(d) 20%

(e) There is insufficient information to answer the question.

(6)[2 points] The following is a pie chart from WorkSafe BC summarizing the distribution of 1464 accidents in the oil and gas industry over the years 2001 – 2005.



How many injuries were due to falls or other causes? (rounded to nearest whole number)

(a) 322

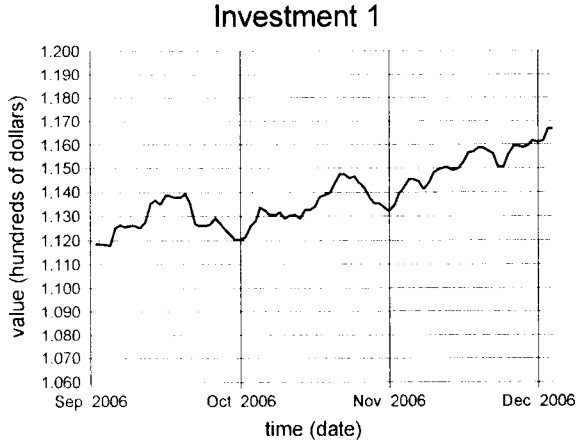
(b) 1464

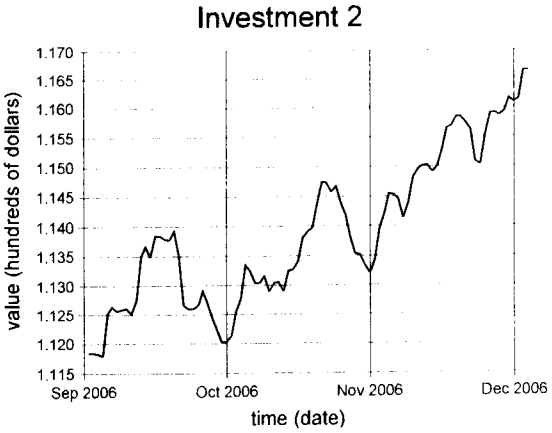
(c) 586

(d) 908

(e) 22%

(7)[2 points] To the nearest \$10, which of the following two investments show a greater increase over the period Nov 2006 to Dec 2006?





(a) Investment 1.

(b) Investment 2.

(c) Both are about the same.

(d) They cannot be compared because the vertical scales are different.

(e) They cannot be compared because line graphs are not appropriate for representing numerical data.

(8)[2 points] In the following stemplot

1	2 2 2 2 2 8 9 9
2	1 1 1 4 4 4
3	5 6 6
4	3 4 5 5
5	9 9
6	0
7	
8	
9	7

the maximum of the observations is

(a) 99.

(b) also an outlier.

(c) 97.

(d) (a) and (b).

(e) (b) and (c).

(9)[2 points] A normal distribution with mean 10 and standard deviation 5 has 68% of observations between

(a) 10 and 15.

(b) 5 and 10.

(c) 5 and 15.

(d) -5 and 15.

(e) 95% and 99.7%.

(10)[2 points] In a certain normal distribution the range of observations within two standard deviations of the mean is 147 to 589. What is the mean of the distribution?

(a) 368.

(b) 184.

(c) The same as the median.

(d) (a) and (c).

(e) (b) and (c).

Question 2 The age as of last birthday for 11 students is reported as follows:

$$17, 18, 18, 18, 19, 19, 20, 21, 22, 23, 47$$
$$\quad\ Q_1 \qquad\quad M \qquad\quad Q_3$$

(a)[**5 points**] Give the five number summary for this data.

min = 17

Q_1 = 18

M = 19

Q_3 = 22

max = 47

(b)[**3 points**] Compute $\bar{x}$.

$$\bar{x} = \frac{17+18+18+18+19+19+20+21+22+23+47}{11}$$

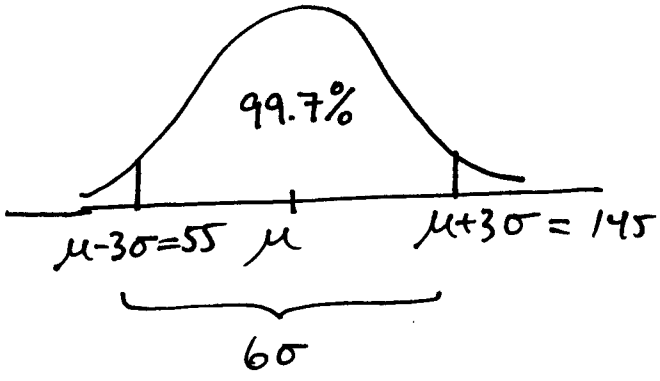
$$= 22$$

(c)[**2 points**] What is a better measure of center for this data: the mean or median? Explain.

The outlier 47 pulls the mean toward the right, resulting in a mean with 8 individuals with ages less than $\bar{x}$ and only 2 with ages greater than $\bar{x}$. The median, however, gives a more accurate picture of the center of the data.

Question 3 IQ scores are normally distributed with mean 100.

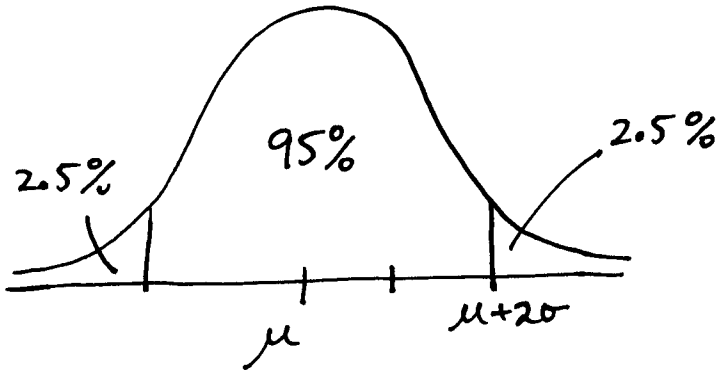
(a)[**4 points**] If 99.7 of all IQ scores fall within the range of 55 to 145, what is the standard deviation of the distribution of IQ scores?



$\therefore \quad \sigma = \frac{145-55}{6}$

$= \boxed{15}$

(b)[**3 points**] Find the IQ score ~~achieved by~~ above which the top 2.5% of those taking the test scored.

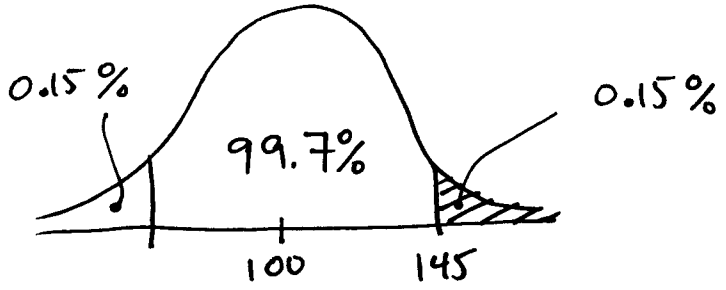


$\mu = \frac{55+145}{2} = 100$

$\therefore \quad \mu + 2\sigma = 100 + 2(15)$

$= \boxed{130}$

(c)[**3 points**] What percentage of those taking the IQ test score higher than 145?

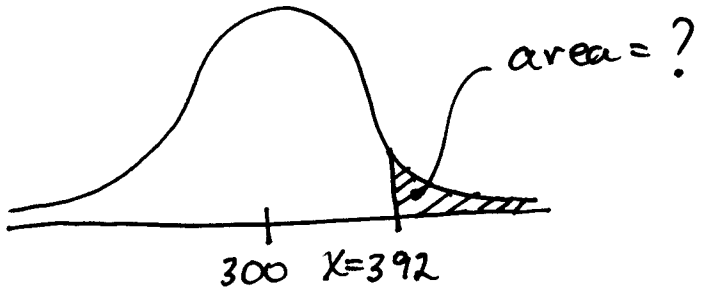


∴ percentage scoring above 145 is

$\boxed{0.15\%}$

Question 4 The lifetime of a certain type of light bulb is normally distributed with a mean of 300 days and a standard deviation of 40 days.

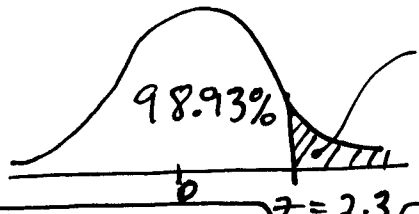
(a)[3 points] What proportion of light bulbs last more than 392 days?



$X = 392$

$z = \frac{392-\mu}{\sigma} = \frac{392-300}{40} \doteq 2.3$

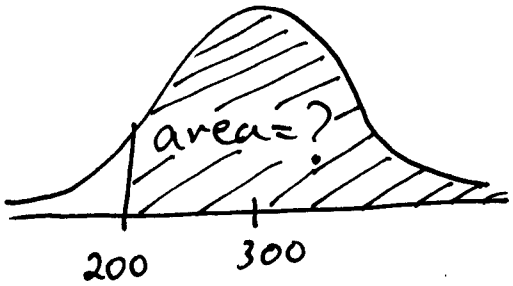
Using TABLE B:



$\therefore 100 - 98.93 = 1.07\%$

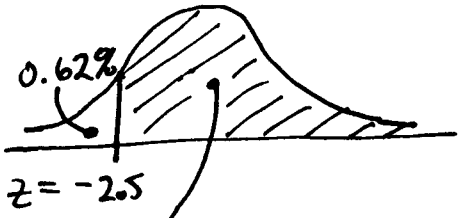
$\therefore$ 1.07% last more than 392 days

(b)[3 points] What proportion of light bulbs last at least 200 days?



$z = \frac{200-300}{40} \doteq -2.5$

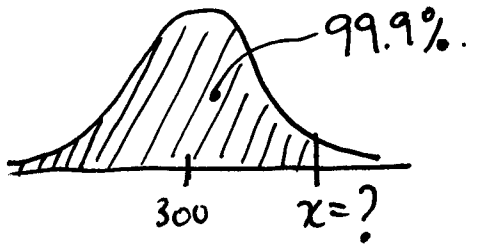
Using TABLE B:



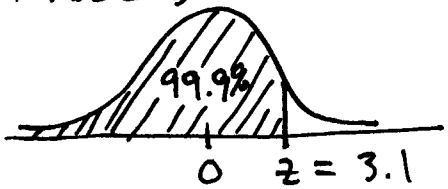
$\therefore 100 - 0.62 = 99.38\%.$

$\therefore$ 99.38% last at least 200 days

(c)[4 points] How many days does it take for 99.9% of light bulbs to fail?



Using TABLE B:



$\therefore 3.1 = \frac{X-\mu}{\sigma} = \frac{X-300}{40}$

$\therefore X = 300 + (3.1)(40) = 424$

$\therefore$ 99.9% fail within 424 days