# **Stats 2B03 Test #1** (Version 1)
# **February 10th, 2015**

**Name**:_____
(Last Name) (First Name)

**Student Number:**_____

This test consists of 20 multiple choice questions worth 1 mark each (no part marks), and one question worth one mark on proper computer card filling. Questions must be answered on the COMPUTER CARD with an HB PENCIL. Marks will not be deducted for wrong answers (i.e., there is no penalty for guessing). You are responsible for ensuring that your copy of the test is complete. Bring any discrepancy to the attention of the invigilator. Only the McMaster standard calculator Casio fx-991 is allowed.

**1.** Six healthy three-year old female Suffolk sheep were injected with the antibiotic Gentamicin, at a dosage of 10 mg/kg body weight. Their blood serum concentrations ($\mu g$/ml) of Gentamicin 1.5 hours after injection were as follows

$$33,\ 26,\ 34,\ 31,\ 23,\ 25$$

Assuming that the serum concentrations follow a normal distribution, find a 99% confidence interval for the average blood serum concentration of Gentamicin 1.5 hours after injection.

**(a)** $(22.36, 34.97)$ **(b)** $(21.11,\ 36.22)$ **(c)** $(23.85,\ 33.48)$ **(d)** $(24.31, 33.03)$
**(e)** $(24.99,\ 32.34)$

**2.** Consider the stem and leaf plot produced by Minitab below. Find the value of the missing depth $x$ (in the third row).

```
Stem-and-leaf of C7  N  = 1103
Leaf Unit = 1.0
N* = 51

 ?     1   5
 ?     2   0005555
 x     3   000000000055555555555555555
 82    4   0000000000000000005555555555555555555555555
 166   5   00000000000000000000000000000000000000000000055555555555555555+
 310   6   00000000000000000000000000000000000000000000000000000000000000+
 517   7   00000000000000000000000000000000000000000000000000000000000000+
(265)  8   00000000000000000000000000000000000000000000000000000000000000+
  ?    9   00000000000000000000000000000000000000000000000000000000000000+
 67    10  00000000000000000000000000000000000000000000000000000000000000+
```

**(a)** 34 **(b)** 32 **(c)** 36 **(d)** 37 **(e)** 29

**3.** Let $Z$ be a standard normal random variable. Find the value of $z_1$ such that $P(-z_1 < Z < z_1) = .4839$.

**(a)** $0.87$ **(b)** $1.24$ **(c)** $0.65$ **(d)** $1.55$ **(e)** $0.78$

**4.** Consider the data set that is summarized in the Minitab output below. The variables summarized are `exercise` (`0` = none, `1` = light, `2` = moderate, `3` = heavy) and `gender`.

```
Tabulated statistics: EXERCISE, GENDER

Rows: EXERCISE   Columns: GENDER

         F   M  All

0       21  10   31
1       12  22   34
2        5   6   11
3        4   5    9
All     42  43   85

Cell Contents:      Count
```

If a person is randomly selected from the above data, find the probability that their exercise level is light or moderate, given that they are male.

**(a)** .6512 **(b)** .6222 **(c)** .3778 **(d)** .4048 **(e)** .7442

**5.** Consider the Minitab Output below which is a cross-tabulation table of the variables `exercise` (`0` = none, `1` = light, `2` = moderate, `3` = heavy) and `smoking status` (`0` = does not smoke, `1` = smokes less than one pack per day, `2` = smokes one or more packs per day) from the Databank data set. If two people are selected at random from the group of people summarized in the below output, find the probability that exactly one of them does not smoke.

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**Tabulated statistics: EXERCISE, SMOKING STATUS**

```
Rows: EXERCISE   Columns: SMOKING STATUS

         0   1   2  All

0       17  14   7   38
1       15  18   5   38
2        8   3   2   13
3        7   2   2   11
All     47  37  16  100

Cell Contents:      Count
```

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**(a)** .5032 **(b)** .4982 **(c)** .2491 **(d)** .2516 **(e)** .4760

**6.** A medical researcher proposes to estimate the mean serum cholesterol level of a certain population of middle-aged men, based on a random sample from the population. He asks a statistician for advice. The ensuing discussion reveals that the researcher wants to estimate the population mean accurate to within 6 mg/dl with 95% confidence. Also, the researcher believes that the standard deviation of serum cholesterol in the population is probably about 40 mg/dl. How large a sample does the researcher need to take?

**(a)** 482 **(b)** 683 **(c)** 171 **(d)** 121 **(e)** 358

**7.** Which of the following is a correct stem and leaf plot?

**(a)**
```
Stem-and-leaf of C3  N  = 8
Leaf Unit = 0.10

 2   2  89
 4   3  02
(1)  4  1
 3   5  4
 2   6  79
```

**(b)**
```
Stem-and-leaf of C3  N  = 8
Leaf Unit = 0.10

 2   2  89
(2)  3  02
 4   4  1
 3   5  4
 2   6  79
```

**(c)**
```
Stem-and-leaf of C3  N  = 8
Leaf Unit = 0.10

 2   2  89
(2)  3  02
 1   4  1
 1   5  4
 2   6  79
```

**(d)**
```
Stem-and-leaf of C3  N  = 8
Leaf Unit = 0.10

 2   2  89
(4)  3  02
 3   4  1
 3   5  4
 2   6  79
```

**(e)**
```
Stem-and-leaf of C3  N  = 8
Leaf Unit = 0.10

 3   2  189
(2)  3  02
 3   4  1
 3   5  4
 2   6  79
```

**8.** The brain weights of a certain population of adult Swedish males follow approximately a normal distrubution with mean of 1,400 gm. 80% of such males have a brain weight greater than 1,300 gm. What is the standard deviation of the brain weights?

**(a)** 146.37 gm **(b)** 102.76 gm **(c)** 128.43 gm **(d)** 119.05 gm **(e)** 111.65 gm

**9.** Consider the data set that is summarized in the Minitab output below. The variables summarized are `exercise` (`0` = none, `1` = light, `2` = moderate, `3` = heavy) and `gender`.

```
Tabulated statistics: EXERCISE, GENDER

Rows: EXERCISE   Columns: GENDER

         F   M  All

0       21  10   31
1       12  22   34
2        5   6   11
3        4   5    9
All     42  43   85

Cell Contents:      Count
```

If a person is randomly selected from the above data, find the probability that their exercise level is moderate or heavy, or that they are female.

**(a)** .2143 **(b)** .6235 **(c)** .7294 **(d)** .8235 **(e)** .1059

**10.** Consider the following Minitab output which summarizes the birthweights in ounces (`tounces`) categorized by `sex` (`1` = male, 2 = female) from the birth data set.

```
Descriptive Statistics: tounces

Variable  sex    N  N*    Mean  SE Mean  StDev  Minimum      Q1  Median     Q3
tounces   1    260   0  116.96     1.54  24.81    16.00  105.25  119.00 134.00
          2    240   0  115.28     1.30  20.18    33.00  105.00  116.50 128.00

Variable  sex  Maximum
tounces   1     169.00
          2     165.00
```

Which of the following statements is true?

**(a)** Considering only the birthweights of the males, the maximum value of 169 is an adjacent value.
**(b)** Considering only the birthweights of the males, the minimum value of 16 is an adjacent value.
**(c)** Considering only the birthweights of the females, the maximum value of 165 is an adjacent value.
**(d)** Considering only the birthweights of the females, the minimum value of 33 is an adjacent value.
**(e)** all of the above

**11.** Consider the following data set,

28.7, 43.1, 57.2, 61.5, 36.2, 41.7, 31.5, 18.6, 25.4

Find the third quartile $Q_3$.
**(a)** 19.1 **(b)** 48.57 **(c)** 50.15 **(d)** 46.63 **(e)** 53.68

**12.** Consider the following grouped frequency distribution of the length of pregnancy (`weeks`) from the birth data set.

```
codedweeks  Count CumPct
021-024       ?    0.40
025-028       ?    1.40
029-032       ?    2.81
033-036       ?   12.22
037-040       ?   82.36
041-044       ?   99.20
045-048       ?  100.00
     N=       ?
     *=       ?
```

What percentage of the pregnancies (for which the `weeks` data was available) lasted between 29 and 40 weeks?

**(a)** 79.55% **(b)** 10.82% **(c)** 80.96% **(d)** 97.39% **(e)** 15.03%

**13.** A researcher has a data set with $n = 16$ observations and computes the sample mean to be $\overline{x} = 28.7$. The researcher then discovers an additional data value of 15.4 that was not included in the original data set. If this new data value is now added to the original data set, what is the new value of $\overline{x}$?

**(a)** 22.05 **(b)** 27.92 **(c)** 29.66 **(d)** 29.59 **(e)** 27.34

**14.** The CDC receives reports of 7.7 cases of typhoid fever per week, on average, from all over the Unites States. Assuming that the number of reported cases per week of typhoid fever follows a Poisson distribution, find the probability that there are at least 2 cases reported in the next week.

**(a)** .9965 **(b)** .9960 **(c)** .9995 **(d)** .0134 **(e)** .0169

**15.** The heights of a certain population of corn plants follow a normal distribution with mean 145 cm and standard deviation 22 cm. Suppose that we were to choose at random from the population a large number of samples of 16 plants each. In what percentage of the samples would the sample mean height be between 135 and 150 cm?

**(a)** 61.73 **(b)** 8.26 **(c)** 26.46 **(d)** 14.7 **(e)** 78.42

**16.** A researcher collects some data and wants to check whether the data comes from a population that follows a normal distribution. So the researcher produces a normal probability plot. The first $(x, y)$ pair used to construct the normal probability plot was $(28.43,\ -2.17)$. What was the sample size?

**(a)** 46 **(b)** 16 **(c)** 8 **(d)** 12 **(e)** 27

**17.** In a study of human blood types in nonhuman primates, a sample of 71 orangutans were tested and 14 were found to be blood type B. Construct a 90% confidence interval for the proportion of orangutans that are blood type B.

**(a)** $(.105, .290)$ **(b)** $(.076,\ .319)$ **(c)** $(.100,\ .294)$ **(d)** $(.120,\ .275)$ **(e)** $(.052,\ .331)$

**18.** Suppose that a researcher collects a sample of size 53 and produces the following confidence interval for the proportion of birds in the Carolina Junco,

$$(.651,\ .858)$$

What was the confidence level?

**(a)** 96% **(b)** 98% **(c)** 94% **(d)** 90% **(e)** 92%

**19.** If two carriers of the gene for albinism marry, each of their children has probability $\frac{1}{4}$ of being albino. If such a couple has 6 children, what is the probability that exactly 2 of them will be albino?

**(a)** .0198 **(b)** .0625 **(c)** .1357 **(d)** .2966 **(e)** .3421

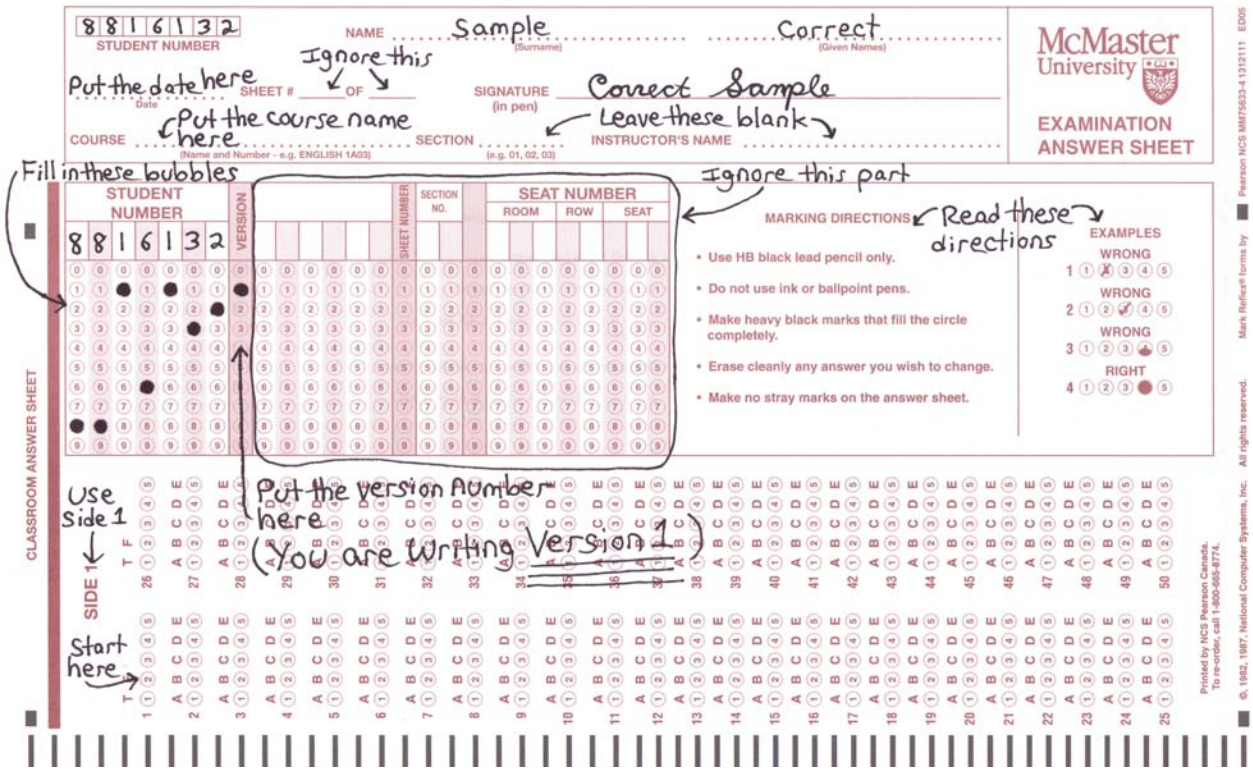
**20.** Consider the following Minitab output which summarizes the birthweights in ounces (`tounces`) categorized by `sex` (`1` = male, `2` = female) from the birth data set.

```
   Descriptive Statistics: tounces

Variable  sex     N  N*    Mean  SE Mean  StDev  Minimum      Q1  Median      Q3
tounces   1     260   0  116.96     1.54  24.81    16.00  105.25  119.00  134.00
          2     240   0  115.28     1.30  20.18    33.00  105.00  116.50  128.00

Variable  sex  Maximum
tounces   1     169.00
          2     165.00
```

Fill in the blank (by selecting the appropriate answer below). Approximately 195 of the male birthweights were greater than _____ (how many?) ounces.

**(a)** 169.00 **(b)** 116.96 **(c)** 119.00 **(d)** 134.00 **(e)** 105.25

**21.** Correctly fill out the bubbles corresponding to your student number and the version number of your test in the correct places on the computer card.
**Hint:**



**Answers** (Version 1)**:**

**1.** b **2.** d **3.** c **4.** a **5.** a **6.** c **7.** b **8.** d **9.** b **10.** a
**11.** c **12.** c **13.** b **14.** b **15.** e **16.** a **17.** d **18.** e **19.** d **20.** e