# DAWSON COLLEGE
# DEPARTMENT OF MATHEMATICS
# 201-BZS-05
# PROBABILITY AND STATISTICS
# FALL 2015
# FINAL EXAM

Name:_____ Date: December 24th, 2015

Student Number:_____ Time: 9:30 – 12:30

Grade: _____ / 116

Examiner: Matthew MARCHANT

1. No books or notes are permitted.
2. Only calculators without text storage and graphical capability are permitted.
3. Please show all your work clearly.
4. Please justify all your answers.
5. Cheating will result in a minimum penalty of zero in your exam grade.
6. Unless otherwise stated, round your answer to 2 decimal places.

4. [10 marks] A company has 10 identical machines that produce nails . The probability that a machine will break down is 0.1. Define a random variable X to be the number of machines that will break down in a day.
   a. What is the appropriate probability distribution for X?
   b. Give the expression for the probability that r machines will break down.
   c. Compute the probability that at least 1 machines will break down.
   d. What is the expected number of machines that will break down?
   e. What is the variance of the number of machines that will break down?

   ANS:
   a. Binomial
   b. P(X=r)=C(10,r)p^r x q^(10-r)
   c. P(X>=1)=1-P(X<1)=1-P(X=0) = 0.65
   d. E(X) = 1
   e. Var(X) = 0.9

5. [12 marks] Participants of a study with sinusitis received either an antibiotic or a

6. [12 marks] The following sample data pertain to the shipments received by a large firm from three different vendors. Test at the 0.01 level of significance whether the quality level of the items received and the vendor are .

| | Number rejected | Number imperfect but acceptable | Number perfect | |
|---|---|---|---|---|
| Vendor A | 12 | 23 | 89 | ! =124 |
| Vendor B | 8 | 12 | 62 | ! =82 |
| Vendor C | 21 | 30 | 119 | ! =170 |
| | ! =41 | ! =65 | ! =270 | ! =376 |

8. [10 marks] Consider the following data for the time to commute to work for 10 employees:

| Employee | Time to commute (min) |
|---|---|
| | |
| | |
| | |
| | |
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| | |
| | |
| | |

c. Cluster sampling would take less time as we would sample fewer students.
d. Stratified sampling because we are using more samples and not leaving out groups which is risky.

10. [8 marks] A student receives emails according to a Poisson distribution with an average of 53.5 e-mails every week.
    a. Calculate the probability that

12. [12 marks] Researchers studying anthropometry collected body girth measurements and skeletal diameter measurements, as well as age, weight, height and gender for 507 physically active individuals. The scatterplot below shows the relationship between height and shoulder girth (over deltoid muscles), both measured in centimeters.

The mean shoulder girth is 108.20 cm with a standard deviation of 10.37 cm. The mean height is 171.14 cm with a standard deviation of 9.41 cm. The coefficient of linear correlation between height and shoulder girth is 0.67.

c. Write the equation of the regression line for predicting height.

d. Interpret the slope and the intercept in this context.

$P(X \quad k) \quad C(n,k)p \ \ q$
$\mu \quad np, \quad \sigma^2 \quad npq$

$$f(x) \quad \begin{cases} \lambda e & x \quad 0 \\ 0 & x \quad 0 \end{cases}$$

$$\frac{\sigma}{\sqrt{\$}} \approx \frac{''}{\sqrt{\$}}$$

!"#$#!%!&'()*!+,*(-.*+!!±!!/0"#

$$\frac{''\#\$\%!\$\%\&\%'\$\%'()!!''}{!} = \frac{*+',\%!\#\$\%'-\&\%\#!.!,/00!1\&0/\#}{\#\$}$$