

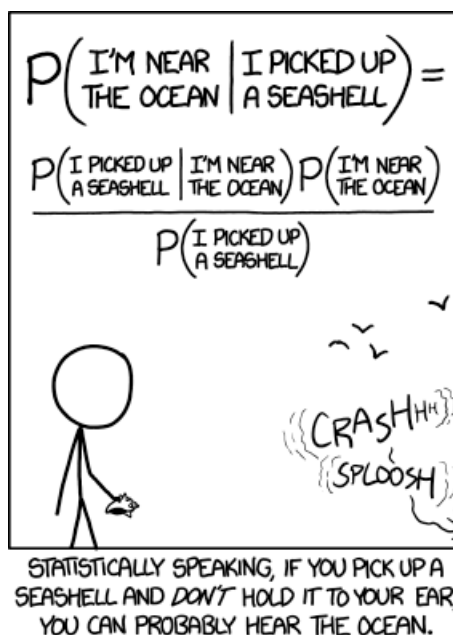
TRENT UNIVERSITY  
**MATH 1550H Test**  
 15 July, 2013. *Time: 60 minutes*

Name: \_\_\_\_\_

STUDENT NUMBER: \_\_\_\_\_

**Bonus.** Is the equation given in the comic at right correct? Explain why or why not. [1]

[Taken from the webcomic *xkcd* on 2013.07.10. It can be found at <http://xkcd.com/1236/> and is licensed under a Creative Commons Attribution-NonCommercial 2.5 License.]



Question	Mark
1	_____
2	_____
3	_____
<b>Bonus</b>	_____
<b>Total</b>	_____

**Instructions**

- *Show all your work.* Legibly, please!
- *If you have a question, ask it!*
- Use the back sides of the test sheets for rough work or extra space.
- You may use a calculator and an aid sheet.
- You need not simplify numerical answers unless it's easy to do ...

1. Do any *three (3)* of **a–d**. [ $12 = 3 \times 4$  each]
  - a. A number is chosen at random from  $\{1, 2, 3, \dots, 100\}$ . Let  $A$  be the event that the number is divisible by 5 and let  $B$  be the event that the number is divisible by 3. Determine whether  $A$  and  $B$  are independent or not.
  - b. A fair coin is tossed five times. What is the probability that exactly two heads will occur in the five tosses?
  - c. Three cards are drawn at random, one at a time and without replacement, from a standard 52-card deck. What is the probability that all three are from different suites?
  - d. How many different ways are there to rearrange the letters in the word “unusual” if there is no way to tell the “u”s apart?

2. Do any *one* (1) of **a** or **b**. [ $8 = 1 \times 8$  each]
- a.** Initially, Bin I has four blue and six red balls, Bin II has three blue and seven red balls, and Bin III is empty. A ball is chosen at random from each of Bins I and II and put into Bin III. One of the two balls now in Bin III is then chosen at random. What is the probability that the ball chosen from Bin III is blue? What is the probability that the ball chosen from Bin III is blue, given that the ball chosen from Bin I is red?
- b.** A fair coin is tossed four times. Let  $X$  be the number of heads that occur in the four tosses. Compute the expected value,  $E(X)$ , and standard deviation,  $\sigma_X$ , of  $X$ .

- 3.** Do any *two* (2) of **a–c**. [ $10 = 2 \times 5$  each]
- a.** Show that if events  $A$  and  $B$  are independent, then  $A$  and  $B^c$  are independent too.
  - b.** A bin contains four green and six purple balls. What is the expected number of green balls if three balls are chosen randomly, with replacement, from the bin?
  - c.** A fair die is rolled twice. What is the probability that both rolls came up 5, given that the sum of the two rolls is a number divisible by 5?

[Total = 30]