

STAT 230 - SPRING 2008 - TEST 2

First (given) Name: _____ Last (family) Name: _____

ID #: _____ UserID: _____

Please circle the correct section number below:

Name	Section	Lecture Time
Diana Chisholm	1	10:30-11:20MWF
Diana Chisholm	2	09:30-10:20MWF
Ryan Browne	3	01:30-02:20MWF

Mark _____ / 30

1. [12 marks] Each person has either O, A, B, or AB type blood. O can receive donations from O only, A can receive from O or A, B can receive from O or B, and AB can receive from any type of blood. In Canada, the breakdown of population by blood type is as follows: $O = 0.46$ $A = 0.42$ $B = 0.09$ $AB = 0.03$

The probability a person with a given blood type will actually donate blood is as follows: $O = 0.10$ $A = 0.07$ $B = 0.04$ $AB = 0.03$

- (a) [3 marks] What is the probability of a blood donation occurring?
- (b) [4 marks] Given a donation has occurred, what is the probability a type B person can receive it?
- (c) [3 marks] Given a random donation that a type B person can receive, what is the probability it was actually a type O donation?

- (d) [2 marks] If someone's blood type is unknown, O blood is always used, to be safe. What is the probability that type O blood is not actually needed?

2. [6 marks] A large section of STAT 230 contains 140 students: 84 guys and 56 girls. Suppose we form a committee of 7 students from this class.

- (a) [2 marks] Give an expression for the exact probability the committee contains at most 5 girls.

- (b) [2 marks] Using a suitable approximation, calculate the probability in a).

- (c) [2 marks] Justify the approximation in b).

3. [12 marks] The probability function (pf) of a random variable X is given by:

$$f(x) = kx \text{ for } x = 1, 2, \dots, 9$$

- (a) [3 marks] Find k .

- (b) [5 marks] Find $F(x)$, the cumulative distribution function (cdf) of X , for all values of x .

- (c) [4 marks] Sketch the probability function (histogram) and the cumulative distribution (graph) of X for $0 \leq x \leq 5$.