

# Practice Test

MATH2380 – MATHEMATICS FOR THE ENVIRONMENT – SPRING 2013

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1. A friend says that he stole your public key for your public/private key encryption system, and claims to now be able to read your email. Should you be worried?
2. Consider the following election results on a preference ballot, where the top row represents the number of ballots returned with the given preference.

	16	14	20	12	15	15	8
1st	A	B	C	C	D	C	B
2nd	B	A	A	D	A	B	C
3rd	C	C	B	B	B	D	A
4th	D	D	D	A	C	A	D

Who wins this election using Plurality? Borda Count (3 points for first preference, 2 for second, and so on)? Instant Runoff? Ranked Pairs?

3. Using the Warpiri family line rules (chapter 15), consider the following situation. A brother and sister are born to the same mother. How many generations must occur before a descendant of the brother is able to marry a descendent of the sister (assuming each subsequent generation has children at the same time).
4. You receive the following message: “Good day, With warm heart I offer my friendship, and my greetings, and I hope this letter meets you in good time. It will be surprising for you to receive this proposal from me since you do not know me personally.

However, I am sincerely seeking your confidence in this transaction, which I, propose with my free mind and as a person of integrity.

- A) It is practically impossible for me to carry out this business alone, as I know nothing of binary numbers.
- B) You live in a foreign land far away from mine, preferably one with computers and knowledge of binary arithmetic.

This should normally not be a requirement, but when you understand the transaction then you will understand why it is important that you live far away from me ... as my country has little knowledge of binary numbers.

- C) The amount of money involved in this transaction is Fifteen Million one hundred thousand united states dollars (US\$15,100,000.00) which is too much for a man of modest means like myself to handle in my country.

I am sending you four numbers in binary, each one preceded (on the left) by a single binary parity digit. The parity digit is 0 if the binary number represented is odd and 1 if the binary number represented is even.

010010011 100100010 11110101 011010011

If you can tell me (1) what the numbers represented here are and (2) if the message is reliable, I will give you half of the dollars in the transaction. What are the numbers?”

5. Consider the number in binary: 100111011. In binary, multiply this number by 3 and then add 1. You can check your end result by converting to base 10.
6. How many bits are in a megabyte? (For our purposes, a byte is 8 bits and a megabyte is  $1.0 \times 10^6$  bytes.
7. You go to a friend’s house and are given a freshly microwaved leftover bowl of pho. You catch a glance of the bottom of the container and realize that this pho was just microwaved in a number 3 plastic. Is it safe?