

## (Math 170) Homework 7:

Due March 16, 2007

Exercise 1: Prove  $\sqrt{6}$  is irrational.

Exercise 2: Write out a multiplication table for all numbers  $\{0, 1, \dots, 10\}$  modulo 11. What are the multiplicative inverses of each number other than 0?

Exercise 3: Write out a multiplication table for all numbers  $\{0, 1, \dots, 11\}$  base 12. Which numbers have multiplicative inverses? What are they?

For example, the multiplication table for numbers modulo 3 is the following

	0	1	2
	→		
0	0	0	0
1	0	1	2
2	0	2	1

- Exercise 4:
- (a) Does 7 divide the coefficient of  $x^4y^3$  in  $(x + y)^7$ ?
  - (b) Does 11 divide the third element of the 11th row of Pascal's triangle? (i.e.  $Row_{11}(3)$ )?
  - (c) Does 4 divide the second element of the 4th row of Pascal's triangle? (i.e.  $Row_4(2)$ )?
  - (d) Does 6 divide the coefficient of  $x^3y^3$  in  $(x + y)^6$ ?

Exercise 5: Encode

YEAH IT IS SPRING BREAK!

using the encoding scheme below.

Exercise 6: Decode

EXFCPTVLWTVBXFD GXL QUEXQUQ VKU DUFVUFEU!

using the encoding scheme below.

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>I</i>	<i>J</i>
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
<i>T</i>	<i>H</i>	<i>E</i>	<i>Q</i>	<i>U</i>	<i>I</i>	<i>C</i>	<i>K</i>	<i>B</i>	<i>R</i>
<i>K</i>	<i>L</i>	<i>M</i>	<i>N</i>	<i>O</i>	<i>P</i>	<i>Q</i>	<i>R</i>	<i>S</i>	<i>T</i>
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
<i>O</i>	<i>W</i>	<i>N</i>	<i>F</i>	<i>X</i>	<i>J</i>	<i>M</i>	<i>P</i>	<i>D</i>	<i>V</i>
<i>U</i>	<i>V</i>	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>				
↓	↓	↓	↓	↓	↓				
<i>L</i>	<i>A</i>	<i>Z</i>	<i>Y</i>	<i>G</i>	<i>S</i>				