Instructions

- Write all answers in capital letters in the spaces provided on the next page!
- Do not remove this answer sheet from the rest of the exam.
- All problems are worth the same amount.
- Problems marked with (EC) are extra credit.
- There is no penalty for guessing however no credit will be given unless some work supporting your answer is shown.
- Problems marked with (*) are those where partial credit will be given if it is clear from the work that you understand how to do the problem but you choose the wrong answer.
- Good Luck!

Math 170

Practice Midterm 2

Due Whenever You Feel Like It

Name _____

TA _____ Section Number _____

1. _____	7. _____
2. _____	8. _____
3. _____	9. _____
(*) 4. _____	(*) 10. _____
5. _____	(*) 11. _____
6. _____	

(1) What is $\sum_{i=0}^{5} 2i + 1$?

(2) Consider the following list of properties

(a) (+ is Associative) For all numbers X, Y and Z, $(X + Y) + Z = X + (Y + Z)$

(b) (Distributivity) For all numbers X, Y and Z, $X * (Y + Z) = X * Y + X * Z$

(c) (Multiplicative Inverse) For all X there is a Y such that $X * Y = Y * X = 1$

(d) (Property of 0) There is a number 0 such that for all X, $X * 0 = 0 * X = 0$.

Which of these properties hold of the Integers Mod 6?

(3) What is $\phi(5^2 \times 7^2 \times 13)$?

(4) Use the extended Euclid's Algorithm to find $gcd(20, 12)$ as well as x, y such that $20x + 12y = gcd(20, 12)$?

(5) What does $(10 \times 5 + 11 \times 4 + 9^2) \bmod 9$ equal?

(6) If the following are the first 11 digits of a bar code, what is the 12th (or check) digit?

2 2 3 3 2 2 3 3 2 2 3

(7) What does 5^{34} mod 17 equal? What is $\phi(17)$?

(8) What is $\phi(25) = \phi(5^2)$? What does 3^{42} mod 25 equal?

(9) What is the greatest common divisor of $2808 = 2^3 \cdot 3^3 \cdot 13$ and $106,080 = 2^5 \cdot 3 \cdot 5 \cdot 13 \cdot 17$?

Consider the following substitution code

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

(10) What do you get when you encode the phrase

ALMOST DONE!

(11) Consider the following three numbers:

- $\frac{5!\cdot 5!}{7!\cdot 3!}$
- $\frac{7!\cdot 3!}{5!\cdot 5!}$
- $\frac{5!\cdot 2!}{2\cdot 5^2}$

List them in order from smallest to largest.