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 3

Due Whenever You Feel Like It

Name _____

TA _____ Section Number _____

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

(1) What is $\sum_{i=-2}^{3} i^2 - 3i$?

(2) Consider the following list of properties

(a) (* is Commutative) For all numbers X and Y, $(X * Y) = (Y * X)$

(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) (Square Root) For all X there is a Y such that $Y * Y = Y^2 = X$.

Which of these properties hold of the Integers Mod 5?

(3) What is $\phi(2^3 \times 5 \times 17)$?

(4) Use the extended Euclid's Algorithm to find $gcd(38, 12)$ as well as x, y such that $38x + 12y = gcd(38, 12)$?

(5) What does $(10 \times 5 + 11 \times 9 + 9^4) \bmod 8$ equal?

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

1 2 3 4 5 5 5 5 5 5 5

(7) What does 5^{92} mod 19 equal? What is $\phi(19)$?

(8) What is $\phi(12) = \phi(2^2 \times 3)$? What does $5^{42} \bmod 12$ equal?

(9) What is the greatest common divisor of $2^5 \cdot 3^4 \cdot 19 \cdot 23$ and $2^6 \cdot 5^7 \cdot 7^5 \cdot 23$?

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

THE LAST PRACTICE EXAM!

(11) Consider the following three numbers:

- $\frac{5!\cdot 6!}{8!\cdot 4!}$
- $\frac{8!\cdot 4!}{5!\cdot 6!}$
- $\frac{6!\cdot 3!}{6\cdot 6}$

List them in order from smallest to largest.