Discrete Mathematics Quiz 10

Name: _____

NYU Net ID: _____

Each question carries one point. Please do all 5 questions on both sides of the paper. Total will be best 4 out of 5.

1.1) Select the correct value for $-74 \ div \ 11$.
a. $-6\frac{8}{11}$
b. -6
*c. -7
d. 7

1.2) Select the correct value for $74 \ mod \ 11$
a. 3
*b. 8
c. -3
d. -8

1.3) Select the correct value for $-74 \ mod \ 11$
*a. 3
b. 8
c. -3
d. -8

2.1) Consider a random integer selected from the range from 2 to 10,000,000,000.
Approximately, what are the chances that the selected number is prime? (Hint: $ln(10) \approx 2.30$.)
a. .0230
b. .230
c. 1/(2.3)
*d. 1/23

2.2) Let $\pi(x)$ be the number of prime numbers in the range from 2 to x. Select the pair of inequalities that are both true.

a. $\pi(1000)\leq\pi(10000)$

$$\frac{\pi(1000)}{1000}\leq\frac{\pi(10000)}{10000}$$

*b. $\pi(1000)\leq\pi(10000)$

$$\frac{\pi(1000)}{1000}\geq\frac{\pi(10000)}{10000}$$

c. $\pi(1000)\geq\pi(10000)$

$$\frac{\pi(1000)}{1000}\leq\frac{\pi(10000)}{10000}$$

d. $\pi(1000)\geq\pi(10000)$

$$\frac{\pi(1000)}{1000}\geq\frac{\pi(10000)}{10000}$$

3.1) Use the following equation to determine the multiplicative inverse of 23 mod 96:

$$1 = 6\cdot 96 - 25\cdot 23$$

a. 6

b. 25

c. -25

*d. 71

3.2) Use the following equation to determine the multiplicative inverse of 25 mod 12:

$$1 = 25 - 12\cdot 2$$

a. 25

*b. 1

c. 12

d. 2

3.3) Use the following equation to determine the multiplicative inverse of 85 mod 2592:

$$1 = 61\cdot 85 - 2592\cdot 2$$

a. 88

b. 56

c. -2

*d. 61

4.1) Select the base 5 representation of 137.

a. $(22)_5$

*b. $(1022)_5$

c. $(2201)_5$

d. $(522)_5$

4.2) Select the binary representation of 51.
a. $(101011)_2$
b. $(110111)_2$
c. $(111011)_2$
*d. $(110011)_2$

4.3) Select the decimal representation for $(407)_{16}$.
a. 261
b. 263
c. 2560
*d. 2567

5.1) Use the Extended Euclidean Algorithm to find s and t such that gcd(x,y) = sx+ty where x = 45, y = 12. Show all work.

Answer:
      45 = 3(12) + 9
      12 = 1(9) + 3
      9 = 3(3)

      gcd = 3

      3 = 12 - 1(9)
      3 = 12 - 1(45 - 3(12)) = 12 (4) - 1 (45)

      s = -1, t = 4

5.2) Use the Extended Euclidean Algorithm to find s and t such that gcd(x,y) = sx+ty where x = 81, y = 54. Show all work.

Answer:
      81 = 1(54) + 27
      54= 2(27)

      gcd = 27

27 = 81 - 1(54)

s = 1, t = -1

5.3) Use the Extended Euclidean Algorithm to find s and t such that gcd(x,y) = sx+ty where x = 142, y = 72. Show all work.

Answer:

142 = 1(72) + 70
72 = 1(70) + 2
70= 35(2)

gcd = 2

2 = 72 - 1(70)
2 = 72 - 1(142 - 1(72)) = 2(72) - 1(142)

s = -1, t = 2