

## CSS 322 – QUIZ 5

First name: \_\_\_\_\_ Last name: \_\_\_\_\_

ID: \_\_\_\_\_

Total Marks: \_\_\_\_\_

out of 5

### Question 1 [2 marks]

Perform the following calculations using modular arithmetic:

- a) Modular 13:  $12 \times 6$
- b) Modular 17:  $8 - 15$
- c) Modular 15:  $12 \div 6$
- d) Modular 17:  $12 \div 6$

### Question 2 [2 marks]

Calculate the following:

- a)  $\phi(16)$
- b)  $\phi(17)$
- c)  $\phi(13)$
- d)  $\phi(221)$

### Question 3 [1 mark]

Euler's theorem states that, for two relatively prime numbers,  $a$  and  $n$ :

$$a^{\phi(n)} \equiv 1 \pmod{n}$$

Derive the answer of:  $15^8 \pmod{16}$ ? You must show (or explain) calculations/derivation.