

Midterm Test (sample) – paper part. 20 points (≥ 8 required). Nothing but pen is allowed.

1. a) Define the greatest common divisor of two integers, and illustrate the definition on 25 and 30. (3 p)

b) When is an integer invertible modulo m ? Which numbers have an inverse modulo 6? (2 p)

c) What is a primitive root? Give an example for the modulus 5. (3 p)

d) Define what congruence modulo m means. Using the definition, decide whether $5 \equiv 11 \pmod{3}$ and $11 \equiv 5 \pmod{4}$ is true. (2 p)
2. a) Perform the **extended** Euclidean algorithm on 420 and 110. (10 p)
b) Find one pair of integer solutions for $420x + 110y = 100$, if possible.
c) Find one pair of integer solutions for $420x + 110y = 99$, if possible.