Section 1 Lecture 4 – Modular Arithmetic 2 - Solutions

Q1)

(i) -14 = (-3) x 6 + 4 so the remainder is 4, so -14 (mod 6) = 4

(ii) -14 = (-3) x 5 + 3 so the remainder is 3, so -12 (mod 5) = 3

(iii) -27 = (-4) x 7 + 1 so the remainder is 1, so -27 (mod 7) = 1

(iv) -24 = (-5) x 5 + 1 so the remainder is 1, so -24 (mod 5) = 1

(v) -101 = (-11) x 10 + 9 so the remainder is 9, so -101 (mod 10) = 9

(vi) -6 = (-2) x 3 + 0 so the remainder is 0, so -6 (mod 3) = 0

(vii) -6 = (-1) x 6 + 0 so the remainder is 0, so -6 (mod 6) = 0

(viii) -99 = (-11) x 9 + 0 so the remainder is 0, so -99 (mod 9) = 0

(ix) -3 = (-1) x 5 + 2 so the remainder is 2, so -3 (mod 5) = 2

Q2) *In most cases, you can either use the table supplied or calculate directly*

(i) This gives 21 which corresponds to V

(ii) This gives 0 which corresponds to A

(iii) This gives 1 which corresponds to B

(iv) A little more thought here – since = 48 = (-2) x 26 + 4 this gives 4 which corresponds to E

(v) This gives 0 which corresponds to A

Q3) Optional further question:

You can define it, (e.g. 2.6 (mod -1.2) = 0.2 since 2.6 = (-2) x (-1.2) + 0.2) but it's not really of much practical use as far as I know – if you do find practical applications let me know!