

Final 2012

Q1 False (counterexample $a=p=1$)

Q2 Answer: D

Q3 True

Q4 Answer: C (the words in the intersection are 1111111, 1010101, 0000111)

Q5 True. Take the code of length 7, distance 3, and with 16 codewords we constructed in the tutorials. Append three zeros to each codeword. This gives 16 codewords of length 10 of distance at least 3.

Q9 The problem is stated incorrectly (a linear binary code with 5 codewords does not exist). If we drop the requirement that the code be linear, an answer would be

00000000

11100000

00011100

11111100

00001111

Q11

(a) 64

(b) Impossible. 16 is not coprime to $(p-1)(q-1)$ and thus does not have an inverse mod $(p-1)(q-1)$.

(c) $\{p,q\} = \{761,811\}$