

PROBLEMS ON NON-LINEAR EQUATIONS

- I.16 The sum of the (real) values of  $x$  for which  $|x + 2| = 3|x - 2|$  is (a) 1 (b) 2 (c) 3 (d) 4 (e) 5
- III.5 For which numbers  $m$  do the equations  $mx - y + 1 = 0$  and  $4x^2 + y^2 - 4 = 0$  have at least one real simultaneous solution? (a) all (b) none (c)  $m \leq 2$  (d)  $-2 \leq m \leq 2$  (e)  $0 \leq m \leq 1$
- IV.13 Among all points  $(x, y)$  which simultaneously satisfy the two inequalities  $x^2 + 2x + y^2 \leq 4$  and  $y \leq |x|$ , the value of  $y$  which is the largest is  
 (a) 2 (b)  $3^{1/2}/2$  (c)  $1 + 5^{1/2}$  (d)  $2^{1/2}$  (e) 3 .
- VI.7 The equations  $x^2 + Ax + 4y^2 = 0$  and  $y = Bx + 5$  necessarily have at least two solutions if (a)  $AB > 10$   
 (b)  $AB < 3$  (c)  $A + B > 5/4$  (d)  $B^2 > A^2 + 1$  (e)  $B < 2A$
- VIII.2 The sum of all solutions of the equation  $x^2 - 7|x| + 3x = 0$  is  
 (a) -6 (b)  $-7/2$  (c) 3 (d) 5 (e) 11
- X.24 The equations  $x^2 + y^2 - 4y = 0$  and  $x^2 + y^2 - 8x - 10y = k$  have exactly one simultaneous solution for  $x$  and  $y$  if  $k =$   
 (a) -32 (b) -16 (c)  $13^{1/2}$  (d)  $3 + 2^{1/2}$  (e) 15