Name (IN CAPITAL LETTERS!): ..... **TID:**

CID: ..... **Personal tutor:** .....

Question 3.

Which of the following statements are true, and which are false? (Justify your answer.)

(a) $n = 3$ if and only if $n^2 - 2n - 3 = 0$;

(b) $n = 3$ if $n^2 - 2n - 3 = 0$;

(c) $n = 3$ only if $n^2 - 2n - 3 = 0$;

(d) For integers a, b: ab is a square only if both a and b are squares;

(e) For integers a, b: ab is a square if both a and b are squares.

Answer.

(a) False: $n^2 - 2n - 3 = (n - 3)(n + 1) = 0$ if and only if $n = 3$ or $n = -1$. **(2 marks)**

(b) False: consider $n = -1$. **(2 marks)**

(c) True: it is clear that: if $n = 3$, then $n = 3$ or $n = -1$. **(2 marks)**

(d) False: if $a = b = 2$ then $4 = ab$ but a and b are NOT squares. **(2 marks)**

(e) True. Proof: a, b squares means $a = m^2$, $b = n^2$ for m, n integers. This implies $ab = m^2n^2 = (mn)^2$ is the square of mn.**(2 marks)**