1) A) $a < 0 \quad b < 0 \quad ab > 0$

Suppose $a$ and $b$ are $> 0$

(can be replaced by earlier vals.)

$a < 0 \rightarrow$ so $a(b) > 0(b) \rightarrow a(b) > 0$ X

↑ since sign must be flipped theorem (iii)

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B) $a < 0 \quad b > 0$ then $ab < 0$

$a < 0$ so $\rightarrow ab < 0(b) \rightarrow ab < 0$ X

↑ thm (ii)

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2) $m^2 = n^2$ then $m = n$ or $m = -n$

$m^2 - n^2 = 0 \xrightarrow{\text{algebra}} (m+n)(m-n) = 0$

where $(m-n) = 0/(m+n) \rightarrow m = n$

or $(m+n) = 0/(m-n) \rightarrow m = -n$

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3) 0 divides $x$ $\quad 0 \mid b$ in $\mathbb{C}$

thus $b = 0 \cdot C$

thus $\boxed{b = 0}$ only

$a \mid 0 = \in \mathbb{Z}$ $\quad 0 \mid a =$ only $0$

(4) $r \mid t$ and $s \mid u \rightarrow rs \mid tu$

$rc = t \quad sc_2 = u \quad rsc_3 = tu$

$mrc_1 + nsc_2 = mt + nu$

$t = rc_1$ then $(rc_1)(sc_2) = (tu)$
$u = sc_2$ $\quad rsc = tu \rightarrow rs \mid tu$

(5)

quotient ↓ remainder

$117653 = 4(27869) + \boxed{6177}$

(6) $83 = 6p + 1$

$82 = 6p$

$\frac{82}{6}$ is not an integer

$\boxed{83}$