Quiz 1 : Function graphs limits

(1)(a) $R(x) = 5x - x^2 = x(5-x)$

$R(x) > 0 \Rightarrow x(5-x) > 0$

$\therefore x > 0$ and $5-x > 0$, $x-5 < 0$, $x < 5$

$\therefore 0 < x < 5$

or | $x < 0$ and $5-x < 0$, $x-5 > 0$, $x > 5$

$\therefore$ not possible

Or any other methods e.g. plot graph, or check if the answered range results in positive R

2 marks

$x = 6[1 - 200/(b+200)]$

(b) $R(b) = 5 \cdot 6\left[1 - \frac{200}{b+200}\right] - 36\left[1 - \frac{200}{b+200}\right]^2$

$= 30\left[1 - \frac{200}{b+200}\right] - 36\left[1 - \frac{200}{b+200}\right]^2$

1 mark

Note if students mistaken $f(b)$ as $6\left[\frac{1-200}{b+200}\right]$, give them marks if they can still find $R(b)$

e.g. as $R(b) = 30\left[\frac{1-200}{b+200}\right] - 36\left[\frac{1-200}{b+200}\right]^2$

(c) $\lim_{b\to\infty} f(b) = 6\left[1 - \frac{200}{\infty}\right] = 6(1-0) = 6$

OR

$\lim_{b\to\infty} f(b) = 6\left[\frac{1-200}{\infty}\right] = 0$

1 mark

(d) depending on their answers in (c)

- (c) answer 6 $\Rightarrow$ because $\lim_{b\to\infty} f(b)$ approaches 6, increasing b will only raise x to a certain level
- (c) answer 0 $\Rightarrow$ because $\lim_{b\to\infty} f(b)$ approaches zero, increasing b does not mean definitely increasing x

$\Rightarrow$ ETC

or any other comments that make sense

e.g. $R(x) > 0$ when $0 < x < 5$, Hence it is not necessary to have $x \geq 5$, hence maybe it is not necessary to increase b to a large amount

1 mark