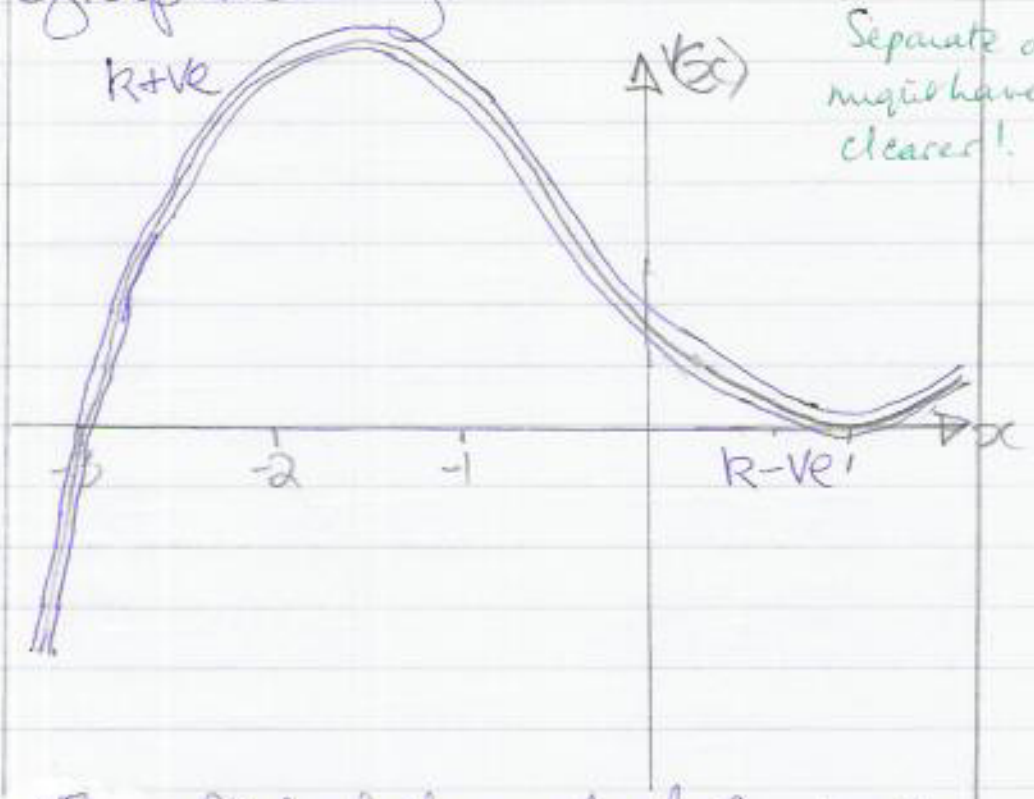
iii) If a small constant term is added to the velocity function it becomes $v(x) = x^3 + x^2 - 5x + 3 + k$. The effect is best illustrated graphically. ✓



Separate diagrams might have been clearer!

The effect of the perturbation is to raise the graph of $v(x)$ by the magnitude of the perturbation if it is +ve, and to lower the graph of $v(x)$ by the magnitude of the perturbation if it is -ve. ✓

If the perturbation is +ve, the fixed point at $x=3$ moves to $x=3+\delta$, $\delta>0$, so there is still a fixed point near $x=3$, but at $x=1$, $v(x)$ forms a tangent to the x axis, so for $v(x) = x^3 + x^2 - 5x + 3 + k$, $k>0$, this point of tangency disappears, so instead of two fixed points, there is one. ✓

The fixed point near $x=-3$