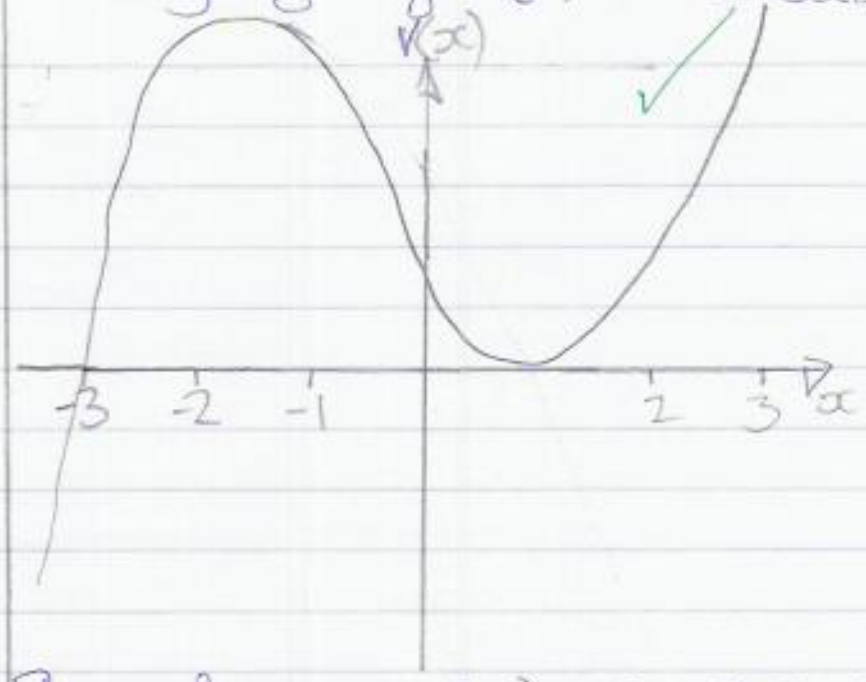
(a)

velocity diagram for $v(x)=x^3+x^2-5x+3$



Phase diagram: $v(x)=x^3+x^2-5x+3$

Fixed point at $x=-3$ is unstable since $\frac{dv}{dx}>0$, and simple since $\frac{dv}{dx}\neq 0$.

$\left(\frac{dv}{dx}(-3)=3(-3)^2+2(-3)-5=16>0 \text{ and } \neq 0\right)$.

The fixed at $x=1$ is not simple since $\frac{dv}{dx}(1)=3(1)^2+2(1)-5=0$. For $x<1$, $v(x)$ is +ve, and for $x>1$, $v(x)$ is +ve, so the fixed point at $x=1$ is neither stable nor unstable.

ii) $v(x)=(x+3)(x-1)^2>0$ for $x\geq 2$, and $\frac{dv}{dx}=3x^2+2x-5$

$=(3x+5)(x-1)>0$ for $x\geq 2$