At $(1,0)$ the eigenvalues of A are

$$\lambda = \frac{1}{2}\left(-1 \pm \sqrt{1-8\alpha^2}\right), \qquad \text{[2 marks]}$$

so there are two possibilities:

a) If $\alpha^2 < \frac{1}{8}$ the fixed point is an stable node, the eigenvalues being real and both negative. [2 marks]

b) If $\alpha^2 > \frac{1}{8}$ the fixed point is an stable spiral, the eigenvalues being complex with negative real part. [2 marks]

As would be expected the centre has been changed by the addition of a linear damping term. If the relative size of the damping is small, that is large α, the centre becomes a stable spiral. If the damping is relatively large it becomes a stable node.