4

$$J = \frac{\partial x_{n+1}}{\partial x_n}\frac{\partial v_{n+1}}{\partial v_n} - \frac{\partial x_{n+1}}{\partial v_n}\frac{\partial v_{n+1}}{\partial x_n} = 1$$

$$\begin{pmatrix} x_{n+1} \\ v_{n+1} \end{pmatrix} = \begin{pmatrix} x_n + v_n h + \frac{a_n h}{2} \\ v_n + \frac{h}{2}(a_{n+1} + a_n) \end{pmatrix}$$

$$\frac{\partial x_{n+1}}{\partial x_n} = 1 \qquad \frac{\partial v_{n+1}}{\partial v_n} = 1$$

$$\frac{\partial x_{n+1}}{\partial v_n} = h \qquad \frac{\partial v_{n+1}}{\partial x_n} = 0$$

$$J = 1 \cdot 1 - h \cdot 0 = 1$$