Name: Grade:

Section 9.1

Solve Problems 13,15, 17, 18,19

Section 9.2

Find all the critical points in each of the system in Problems 5,7,10,13,15,16

Stability/instability

Using the definition of stability and instability to show that the critical point of each of the following differential equations is stable or unstable.

(a) $\mathbf{x}'(\mathbf{t}) = \begin{pmatrix} -2 & 1 \\ 1 & -2 \end{pmatrix} \mathbf{x}$

(b) $\mathbf{x}'(\mathbf{t}) = \begin{pmatrix} 1 & -2 \\ 3 & -4 \end{pmatrix} \mathbf{x}$

(c) $\mathbf{x}'(\mathbf{t}) = \begin{pmatrix} 1 & 1 \\ 4 & -2 \end{pmatrix} \mathbf{x} + \begin{pmatrix} \alpha \\ \beta \end{pmatrix}$, for some given constants α, β.