1. Find the fixed points, investigate the stability of each, and sketch the phase portrait for each of the following equations:
(a) $x^{\prime}=4 x^{2}-16$
(b) $x^{\prime}=x-x^{3}$
(c) $x^{\prime}=-x-x^{3}$
(d) $x^{\prime}=x^{2}\left(4-x^{2}\right)$
(e) $x^{\prime}=1-2 \cos x$
2. Find the fixed points and investigate the stability of each for each of the following systems:
(a) $\left\{\begin{array}{l}x^{\prime}=y \\ y^{\prime}=2 x+y\end{array}\right.$
(b) $\left\{\begin{array}{l}x^{\prime}=2 y \\ y^{\prime}=2 x+5 y\end{array}\right.$
(c) $\left\{\begin{array}{rrrr}x^{\prime} & = & x+y \\ y^{\prime} & = & -2 x+3 y\end{array}\right.$
(d) $\left\{\begin{array}{lll}x^{\prime} & =x+x^{3} & +y \\ y^{\prime} & =2 x+y\end{array}\right.$
3. Find the fixed points, investigate the stability of each, and sketch the phase portrait for each of the following equations:
(a) $x^{\prime}=4 x^{2}-16$
(b) $x^{\prime}=x-x^{3}$
(c) $x^{\prime}=-x-x^{3}$
(d) $x^{\prime}=x^{2}\left(4-x^{2}\right)$
