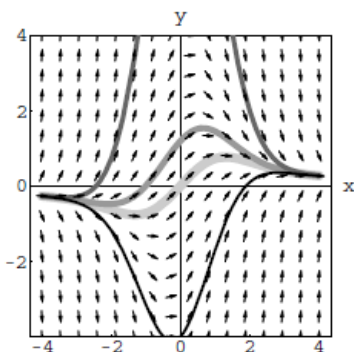
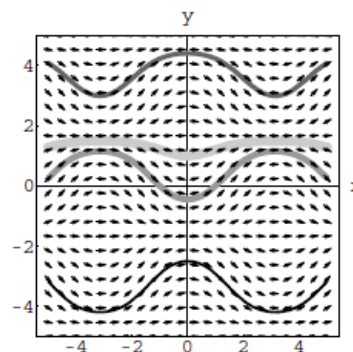


SECTION 2.1

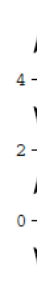
3.



4.



26. Solving $y(2 - y)(4 - y) = 0$ we obtain the critical points 0, 2, and 4. From the phase portrait we see that 2 is asymptotically stable (attractor) and 0 and 4 are unstable (repellers).



27. Solving $y \ln(y + 2) = 0$ we obtain the critical points -1 and 0 . From the phase portrait we see that -1 is asymptotically stable (attractor) and 0 is unstable (repeller).



SECTION 2.2

23. From $\frac{1}{x^2 + 1} dx = 4 dt$ we obtain $\tan^{-1} x = 4t + c$. Using $x(\pi/4) = 1$ we find $c = -3\pi/4$. The solution of the initial-value problem is $\tan^{-1} x = 4t - \frac{3\pi}{4}$ or $x = \tan\left(4t - \frac{3\pi}{4}\right)$.

25. From $\frac{1}{y} dy = \frac{1-x}{x^2} dx = \left(\frac{1}{x^2} - \frac{1}{x}\right) dx$ we obtain $\ln|y| = -\frac{1}{x} - \ln|x| = c$ or $xy = c_1 e^{-1/x}$. Using $y(-1) = -1$ we find $c_1 = e^{-1}$. The solution of the initial-value problem is $xy = e^{-1-1/x}$ or $y = e^{-(1+1/x)}/x$.

26. From $\frac{1}{1-2y} dy = dt$ we obtain $-\frac{1}{2} \ln|1-2y| = t + c$ or $1-2y = c_1 e^{-2t}$. Using $y(0) = 5/2$ we find $c_1 = -4$. The solution of the initial-value problem is $1-2y = -4e^{-2t}$ or $y = 2e^{-2t} + \frac{1}{2}$.

SECTION 2.3

19. For $y' + \frac{x+2}{x+1}y = \frac{2xe^{-x}}{x+1}$ an integrating factor is $e^{\int[(x+2)/(x+1)]dx} = (x+1)e^x$, so $\frac{d}{dx}[(x+1)e^xy] = 2x$ and $y = \frac{x^2}{x+1}e^{-x} + \frac{c}{x+1}e^{-x}$ for $-1 < x < \infty$. The entire solution is transient.
22. For $\frac{dP}{dt} + (2t-1)P = 4t-2$ an integrating factor is $e^{\int(2t-1)dt} = e^{t^2-t}$ so that $\frac{d}{dt}[e^{t^2-t}P] = (4t-2)e^{t^2-t}$ and $P = 2 + ce^{t-t^2}$ for $-\infty < t < \infty$. The transient term is ce^{t-t^2} .
23. For $y' + \left(3 + \frac{1}{x}\right)y = \frac{e^{-3x}}{x}$ an integrating factor is $e^{\int[3+(1/x)]dx} = xe^{3x}$ so that $\frac{d}{dx}[xe^{3x}y] = 1$ and