

Problems from December 5, 2015

1. Show that $y = x - x^{-1}$ is a solution of the differential equation $xy' + y = 2x$.
2. Verify that $y = \sin(x)\cos(x) - \cos(x)$ is a solution of the initial value problem $y' + (\tan x)y = \cos^2 x$ and $y(0) = -1$ on the interval $-\pi/2 < x < \pi/2$.
3. Remember in class we showed that the spring mass system was governed by the differential equation $mx'' = -kx$.
 - (a) For what values of k does the function $x = \cos(kt)$ satisfy the differential equation $4x'' = -25x$?
 - (b) For those values of k , verify that every member of the family of functions $x = A \sin(kt) + B \cos(kt)$ is also a solution.
4. Which of the following functions are solutions of the differential equation $y'' + y = \sin(x)$?
 - (a) $y = \sin x$
 - (b) $y = \cos x$
 - (c) $y = \frac{1}{2}x \sin x$
 - (d) $y = -\frac{1}{2}x \cos x$