Name: _____

Differential Equations, Spring 2017 Quiz 9, April 21

You must show all your work to receive credit. Calculators are allowed.

Problem 1: (3 points) Consider the second order ODE

$$x'' + \sin(x') + 3te^x = t^3.$$

1. Rewrite as a 2 dim 1st order system.
   Solution:
   let $x_1 = x$, $x_2 = x'$
   then $x_2' = x'' = t^3 - \sin(x') - 3te^x = t^3 - \sin(x_2) - 3te^{x_1}$ and the system is

$$\begin{aligned} x_1' &= x_2 \\ x_2' &= t^3 - \sin(x_2) - 3te^{x_1} \end{aligned}$$

2. Let $\vec{G}$ be the function such that your answer above is of the form $\vec{x}' = \vec{G}(t, \vec{x})$. Code the function $\vec{G}$ into Matlab. An outline is provided below.

```
function val=G(t,x)




val=[x(2);t^3-sin(x(2))-3*t*e^(x(1))];



end
```