Math 100 Differential Equations Exam #1
February 27, 2013 SHOW ALL WORK

[10] 1.) By giving a specific example, prove that $f : R \to R,\ f(x) = e^x$ is not onto.

2.) Circle T for true and F for false. Note that the answer to 2a is true.

[3] 2a.) In more advanced math classes, you may be required to provide many more details when proving a function is onto.

T F

[4] 2b.) Suppose ϕ is a solution to the equation, $y' + p(t)y = g(t)$, then 2ϕ must also be a solution to $y' + p(t)y = g(t)$.

T F

[4] 2c.) Suppose ϕ is a solution to the equation, $y' + p(t)y^2 = 0$, then 2ϕ must also be a solution to $y' + p(t)y^2 = 0$.

T F

[4] 2d.) Suppose ϕ is a solution to the equation, $y' + p(t)y = 0$, then 2ϕ must also be a solution to $y' + p(t)y = 0$.

T F

[15] 3.) Draw the direction field for $y' = \frac{1}{2}y + 1$. Determine if there are any equilibrium solutions. If so, determine if the equilibrium solution(s) are stable, unstable or semi-stable.

[15] 4.) Solve the following initial value problem: $y'y = t + 3ty^2$, $y(0) = -2$

Answer 4.) _____

5.) Find the general solutions for the following three differential equations.

[15] 5A.) $2y'' - 3y' + 5y = 0$

Answer 5A.) _____

[15] 5B.) $y'' + 6y' + 9y = 0$

Answer 5B) _____

[15] 5C.) $3y''(y')^2 = 1$

Answer 5C.) _____