Math 202-Section 15   Quiz 3

Sr. Num.:   ID. Num.:   Name:

Q 1: [4 points] Find all values of m so that the function $y = e^{mx}$

is a solution of the differential equation: $2y'' - 5y' - 3y = 0$.

Q 2: [6 points] Consider the initial value problem:

$$y' + (y - 1)(2y - 1) = 0; \quad y(0) = 0.$$

a) Without solving the IVP, show that $\ln\left(\frac{2y-1}{y-1}\right) = x$ is an implicit solution of the IVP.

b) Solve the IVP using separation of variables.

Q 3: [4 points] Use the definition of Exact Differential Equations to find a function $f(x, y)$ that makes the following differential equation exact, $\quad f(x, y)dx + xe^{xy}dy = 0$.

Q 4: [6 points] Find an appropriate integrating factor to make the non-exact differential equation,
$$6xy\,dx + (9x^2 + 4y)dy = 0,$$
exact. **Also, find the general solution.**

Q 5: [5 points] Solve the differential equation using an appropriate substitution: $2xy^3y' + x^4 + y^4 = 0$.

Q 6: [5 points] A thermometer is taken from inside room to the outside, where the air temperature is 5°C. After one minute, the thermometer reads 55°C, and after two minutes it reads 30°C. What is the temperature of the inside room?