MATH 217 – WORKSHEET 01

Q.1 Use the method of separation of variables to solve each of the following ordinary differential equations:

(a) $x^3y' - y^3 = 0$

(b) $y' \cos y = x$

Q.2 Find the particular solution to each of the following differential equations that satisfies the additional property:

(a) $y' = x^2y^2$, and $y = 3$ when $x = 1$.

(b) $y'y^2 = x + 1$, and $y = 3$ when $x = 0$.

Q.3 Consider the differential equation $y''y' = e^x$.

(a) Make the substitution $y' = p$, $y'' = p'$ to obtain a first-order differential equation and solve it for $p = p(x)$.

(b) Solve the equation in part (a) for y satisfying the additional conditions $y'(0) = \sqrt{2}$ and $y(0) = 1$.

Q.4 Find the general solution to the following first order linear differential equations. Then find the particular solution with the given additional condition:

(a) $xy' - 3y = x^4$, additional condition $y = 2$ when $x = 1$.

(b) $y' + 4y = e^{-x}$, additional condition $y = 1$ when $x = 0$.

Q.5 One solution of the differential equation $y' \sin 2x = 2y + 2\cos x$ remains bounded as $x \to \pi/2$. Find this solution.