**Indian Institute of Technology Delhi - Abu Dhabi**
**AMTL101: Linear Algebra and Differential Equations**
**Tutorial 7**

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(1) Solve the following separable equations:

(a) $y^3y' + x^3 = 0$ (b) $y' = e^{2x-1}y^2$

(c) $y' = (y + 4x)^2$ (d) $xy' = y^2 + y$

(2) Find all solutions of the following equations:

(a) $y' - 2y = 1$ (b) $y' + y = e^x$

(c) $y' - 2y = x^2 + x$ (d) $y' - 2xy = xy^2$

(3) Determine whether or not each of the given equations is exact; solve those that are exact.

(a) $(3x^2y + 2)dx - (x^3 + y)dy = 0$

(b) $e^{-y}dx + e^{-x}(-e^{-y} + 1)dy = 0$

(4) Under what conditions for the constants $a, b, k, l$ is $(ax + by)dx + (kx + ly)dy = 0$ exact? Solve the exact ODE.

(5) Solve the IVPs.

(a) $xy' + y = 0, \quad y(4) = 6$

(b) $(2xy - 3)\,dx + (x^2 + 4y)\,dy = 0, \quad y(1) = 2$

(6) If the growth rate of the number of bacteria at any time t is proportional to the number present at t and doubles in 1 week, how many bacteria can be expected after 2 weeks?

(7) In a laundry dryer, loss of moisture is directly proportional to the moisture content of the laundry. If wet laundry loses one fourth of its moisture in the first 10 minutes, when will the laundry be 95% dry.