

MTH 201: Multivariable Calculus and Differential Equations

Problem Set 5: First order ODEs

1. Find a solution to the following first order ODEs.

- (i) $(1 + x^2)y' = xy$
- (ii) $e^{x-y} + e^{y-x}y' = 0$
- (iii) $y^2 - 1 - (2y + xy)y' = 0$
- (iv) $(y^2 + 1)dx + (x^2 + 1)dy = 0$
- (v) $yx^2 dy - y^3 dx = 2x^2$
- (vi) $x \log x dy + \sqrt{1 + y^2} dx = 0$
- (vii) $x \cos y dx + x^2 \sin y dy = a^2 \sin y dy$
- (viii) $e^{y^2}(x^2 + 2x + 1) dx + (xy + y) dy = 0$
- (ix) $(1 - x) dy = x(y + 1) dx, y(0) = 0$
- (x) $y dy + x dx = 3xy^2 dx, y(2) = 1$
- (xi) $(x + 2y) dx + (3x + 6y + 3) dy = 0$
- (xii) $(x + y - 1) dx + (2x + 2y - 3) dy = 0$
- (xiii) $(y + 7) dx + (2x + y + 3) dy = 0, y(0) = 1$
- (xiv) $(x + y) dx + (3x + 3y - 4) dy = 0, y(1) = 0$
- (xv) $\cos y dx - (x \sin y - y^2) dy = 0$
- (xvi) $(x^2 - x + y^2) dx - (e^y - 2xy) dy = 0$
- (xvii) $(y^2 e^{xy^2} + 4x^3) dx + (2xye^{xy^2} - 3y^2) dy = 0, y(1) = 0$
- (xviii) $\sin x \cos y dx + \cos x \sin y dy = 0, y(\pi/4) = \pi/4$
- (xix) $(x^2 + y \cos x) dx + (y^3 + \sin x) dy = 0$
- (xx) $y(2x + y^3) dx - x(2x - y^3) dy = 0$
- (xxi) $(x - 2xy + e^y) dx + (y - x^2 + xe^y) dy = 0$
- (xxii) $(e^x \sin y + e^{-y}) dx - (xe^{-y} - e^x \cos y) dy = 0.$
- (xxiii) $\frac{xy+1}{y} dx + \frac{2y-x}{y^2} dy = 0$
- (xxiv) $(2xy + x^2 + b) dx + (y^2 + x^2 + a) dy = 0$
- (xxv) $(y^2 + 12x^2y) dx + (2xy + 4x^3) dy = 0$
- (xxvi) $2xy dx + (x^2 + y^2 + a) dy = 0$
- (xxvii) $e^x(x + 1) dx + (ye^y - xe^x) dy = 0.$