

1. (3 points) Find an explicit solution for $xy' + xy = e^{-x}$ if $y(1) = e$.

2. (3 points) Use a substitution to find the explicit general solution for $y' = \frac{xy - 2y^2}{x^2}$.

3. (3 points) Find an implicit general solution for $(y^2 + y \cos(xy)) dx + (2xy + x \cos(xy)) dy = 0$

4. (1 point) Simplify $\operatorname{Re}\left(\int_0^\pi e^{(1+2i)t} dt\right)$.