

1. Solve the following differential equations.

a) $y' - 3y = e^x$

b) $y' - 2xy = x$

c) $y' + y = \sin(e^x)$

d) $y' = x + 5y$

e) $y' + 4y = x$

f) $xy' + 2y = e^{x^2}, x > 0$

g) $x^2y' + 2xy = \cos x, x > 0$

2. Solve the following initial value problems.

a) $y' + (\cos x)y = \cos x, y(0) = 2$

b) $y' + y = x + e^x, y(0) = 0$

c) $xy' = y + x^3 \sin x, x > 0, y(\pi) = 0$

d) $xy' - 3y = x^2, x > 0, y(1) = 0$

e) $y' - 2xy = 2xe^{x^2}, y(0) = 3$

f) $(1 + x^2)y' + 2xy = 3\sqrt{x}, y(0) = 2$