SOLUTIONS

SOME DES TO SOLVE

= S = L

You know how to solve first-order *separable* (section 2.2) and *linear* DEs. Decide if these are separable or linear (or both or neither), and find the general solution if possible.

SL **1.** $\frac{dy}{dx} = 1 + x^2$ $y(x) = \int 1 + x^2 dx = x + \frac{x^3}{3} + C$

S **2.** $\frac{dy}{dx} = 1 + y^2$

$\int \frac{dy}{1+y^2} = \int dx$ → $\arctan y = x + C$

$y(x) = \tan(x + C)$

SL **3.** $\frac{dy}{dx} = 1 + y$ (solved as separable:)

$\int \frac{dy}{1+y} = \int dx$ → $\ln|1+y| = x + C$

$1 + y = Ae^x$ → $y(x) = Ae^x - 1$

L **4.** $\frac{dy}{dx} = 1 + xy$

$\frac{dy}{dx} - xy = 1$ → $u(x) = e^{-x^2/2}$

$(e^{-x^2/2} y)' = e^{-x^2/2}$

$y(x) = e^{x^2/2} \int e^{-x^2/2} dx$

[I don't know how to do the integral.] [It is called erf(x), essentially.]

[neither] **5.** $\frac{dy}{dx} = 1 + xy^2$

I don't know how to solve this, or even get started.

SL **6.** $\frac{dy}{dx} = x + xy$ (solved as separable:)

$\int \frac{dy}{1+y} = \int x dx$ → $\ln|1+y| = \frac{x^2}{2} + C$

$1 + y = Ae^{x^2/2}$

$y(x) = Ae^{x^2/2} - 1$