

# Quiz 1

16. November, 2016

1. Given the following differential equation

$$y(x) \cos(x) + y'(x) \sin(x) = 0$$

1. State the order of the differential equation, and whether it is linear or nonlinear.

2. Is it appropriate to treat the equation via the method(s) (circle all that apply):

(a) ... of integrating factors.

(b) ... of separation.

(c) ... for exact equations.

*(Recall that an equation of the form  $M(x, y) + N(x, y)y' = 0$  is exact if and only if  $M_y = N_x$ , and that a theorem proved in class then guarantees  $\exists \phi : \phi_x = M, \phi_y = N$ . These may be integrated to yield  $\phi = \int M dx + h(y)$  and/or  $\phi = \int N dy + k(x)$ .)*

3. Use one of the methods you selected in step 2. to solve the equation. Write your solution explicitly  $y(x) = \dots$

2. Draw lines to match the following equations with solutions.

*Hint: you are not being asked to solve the equations!*

•  $y' = e^{-y}$

•  $y = x$

•  $y' = y(y + 3)$

•  $y = 0$

•  $y' = \cos^2(y) + \sin^2(y)$

•  $y = \ln(x)$

3. Solve the following ordinary differential equation by any method available

$$x'(t) + \frac{x(t)}{t} = \frac{\sin(t)}{t}$$