Quiz 1

16. November, 2016

1. Draw lines to match the following equations with solutions.
Hint: you are not being asked to solve the equations!

- $y' = \cos^2(y) + \sin^2(y)$
- $y' = e^{-y}$
- $y' = y(y+3)$
- $y = x$
- $y = 0$
- $y = \ln(x)$

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

$$y'(x) + \frac{3y(x)}{x} = \frac{\cos(x)}{x^3}$$

3. Given the following differential equation

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

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 $y(x) = \ldots$