

## Class 3 Lecture Assignment

Complete this groupwork and submit it to Gradescope by 4:00pm on your class day. You can print this sheet, or write on your own paper. Contact us if internet connections or other issues require alternate arrangements.

1. State the order of the given differential equation and determine whether the equation is linear or not. Briefly justify your answers!

(a)  $(1-x)y'' - 4xy' + 5y = \cos x$

linear  
 $y' + p(x)y = q(x)$

(e)  $\frac{d^2y}{dx^2} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$

(b)  $x \frac{d^3y}{dx^3} - \left(\frac{dy}{dx}\right)^4 + y = 0$

linear

(f)  $(\sin \theta)y''' - (\cos \theta)y' = 2$

I don't know  
 Linear

(c)  $y(t)'t^2 = y(t)$

Linear

(g)  $y = 0$

Linear

(d)  $\frac{d^2u}{dr^2} + \frac{du}{dr} + u = \cos(r+u)$

Not linear

(h)  $\frac{du}{dr} = e^r$

No

2. **One-minute questions:** Write a sentence for each.

- (a) What is one interesting thing you learned from the book or videos?

I thought the tip in warm-up was helpful

- (b) What is one mathematical question you have about this week's material?

Can you go over (a)