Test 3 Review

I. Finding Derivatives (30%)

- Product Rule
- Quotient Rule
- Chain Rule
  - ↳ $e^{g(x)}$
  - ↳ $\ln g(x)$

Practice Problems: 3.1 # 1 – 28
Test 3 Derivative Practice Worksheet

II: Related Rates (25%)

Things you need to be able to do

(A) Set up problem – translate English to math
(B) Use chain rule to take derivative
(C) Plug in given information to find unknown rate

Practice Problems: 3.3 # 41 – 44
Suppl Ex # 50, 51
Related Rate Notes

III: Exponential Growth/Decay (25%)

- Know

$$y' = ky, \quad y(0) = y_0 \iff y = y_0 e^{kt}$$

y_0 = initial value of y ("y when $t=0$")

k = growth/decay constant

- Be able to answer questions like...
  - What is y' when $y = 17$?
  - What is y when $y' = 32$?

Practice Probs: 5.1 # 1, 2, 3, 4, 14, 16

- Half-life problems, how long does it take for y to decay to ___ % of its initial amount?

Ex: Decay Const $= -0.1$. How long does it take y to decay to 5% of its initial value?

$$0.05 y_0 = y_0 e^{-0.1t}$$

↗ Solve this for t

Practice Problems: 5.1 # 8, 17, 19, 26

Other Stuff (20%)

- Remember how to find max/min (set $y' = 0$ and use 1st/2nd derivative test)
  - ↳ 4.5 # 39, 40, 45
  - 3.1 # 55

- Be ok w/ "real-world" questions
  - ↳ 3.1 # 67, 68
  - ↳ 4.3 # 38
  - ↳ 4.2 # 46

- No optimization

- Be able to combine like terms

  Ex:
  $$(x^2 + 2x - 7)e^{4x} + (-2x^2 + x + 2)e^{4x}$$
  $$= (-x^2 + 3x - 5)e^{4x}$$

- Know 3 definitions of the derivative