I returned POD #03, collected POD #08, and AM NOW assigning POD #09. §2.5: Find the general solution and state an interval on which it is defined. 

\[ y' + 2xy = x^3 \]  

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\[ y' + 2xy = f(x) \]

\[ P(x) = 2x; \quad \int P(x)dx = \int 2x\,dx = x^2 + C \]

(Take C = 0)

\[ \mu(x) = e^{\int P(x)dx} = e^{x^2} \]

Apply the IF & simp.

\[ \mu(x)(y' + 2xy) = \mu(x)x^3 \]

\[ e^{x^2}(y' + 2xy) = x^3e^{x^2} \]

\[ e^{x^2}y' + 2xe^{x^2}y = x^3e^{x^2} \]

\[ (e^{x^2}y)' = x^3e^{x^2} \]

Integrates:

\[ e^{x^2}y = \int x^3e^{x^2}\,dx \]

No time to finish in class.

Finish at home.

**Bonus:**

\[ \text{at least 5.} \]

5, 4, 3, 2, 1.

§2.5: p. 60: #12 Find gen. sol. of the given ODE. State an interval on which it is defined.

\[ \frac{dx}{dy} = x + y \]  

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Sol.: 1. Put into std. form.

\[ dx = (x + y)\,dy \]

\[ 1 = (x + y)\,\frac{dx}{dy} \]

Woops. No can do!

2. \[ \frac{dx}{dy} - x = y \]  

(\#)

\[ x' + P(y)x = f(y) \quad \text{if} \quad P(y) = -1 \quad f(y) = y \]

3. \[ \mu(y) = e^{\int P(y)dy} = e^{-y} \]

4. \[ \mu(y)(x' - x) = \mu(y)y \]

\[ e^{-y}(x' - x) = ye^{-y} \]

\[ (e^{-y}x)' = ye^{-y} \]

\[ e^{-y}x = \int ye^{-y}\,dy \]

\[ e^{-y}x = -ye^{-y} - e^{-y} + C \]

\[ \therefore x = -y - 1 + Ce^y \]

\[ \therefore \frac{x}{Ce^y} - y = 1 \]

Find Domain of x.

Remains to be done.