1. There are several topics about the general existence/ uniqueness thm that I would have liked to discuss if there were time. If you would like to discuss them, that would be great.

A. **Bounds on the growth of** $y(t)$ **and** $y'(t)$. If $f(t,y)$ is bounded by $M$, then $y(t)$ satisfies a Lipschitz constant $M$. In particular, “pathological” behaviors like vertical asymptotes or wild oscillation always occur because $f(t,y)$ becomes unbounded.

B. **Numerical approximation of a sol’n.** We can find “piece-wise linear envelopes” for the graph of $y(t)$ as follows: On a small box $[t_0-a, t_0-a] \times [y_0-b, y_0-b]$ suppose $|f(y, t) - m_0| < \varepsilon_0$. Then the part of the graph in the box is trapped b/w $y_+(t) = y_0 + (m_0 + \varepsilon_0)(t - t_0) \quad \text{and} \quad y_-(t) = y_0 + (m_0 - \varepsilon_0)(t - t_0)$. We can find the intersection pts of $y_+ \& y_- w/ the box and repeat with those as our initial values to get larger large piece-wise linear envelopes.

C. **(Non)- existence/ uniqueness if some hypothesis fail:** They have a homework exercise about this.