List of suggested exercises, Sections 11.1,2,4
For the DGD of June 5th and 7th.

For each of the following differential equation, sketch the slope field, and sketch a few solutions, and convince yourself that there is a unique solution passing through each point in the plane. Then solve the corresponding initial value problems, and see where the curves live in the plane:

$$(i) \quad \frac{dP}{dt} = -2P$$

with $P(0) = 1$ and then $P(-1) = -4$.

$$(ii) \quad \frac{dL}{dp} = \frac{L}{2}$$

with $L(-1) = 10$ and then $L(8) = -12$.

$$(iii) \quad P\frac{dP}{dt} = 1$$

with $P(-1) = 1$and then $P(1) = -1$.

$$(iv) \quad P\frac{dP}{dt} = -1$$

with $P(-1) = 1$ and then $P(1) = -1$.

$$(v) \quad 2\frac{dx}{dy} = x^2$$

with $x(-1) = -1$ and then $x(1) = 1$.

$$(vi) \quad \frac{dz}{dy} = -zy$$

with $z(1) = 1$ and the $z(-2) = -2$.

$$(vii) \quad \frac{dy}{dt} = 0.5(y - 200)$$

with $y(0) = 200$, $(5) = 300$ and then $y(-4) = 100$.

$$(viii) \quad \frac{dz}{dt} = t * e^z$$

with $z(0) = 0$ and then $z(-3) = 3$.

$$(ix) \quad x(x+1)\frac{du}{dx} = u^2$$

with $u(1) = 1$ and then $u(-\frac{1}{2}) = \frac{1}{2}$.

$$(x) \quad \frac{dy}{dt} = y^2(t+1)$$

with $y(-3) = 2$ and then $y(0) = -1$.