

## Exercises from text

Sec 1.4: 5, 27, 30

Sec 1.5: 1, 18

## Additional problems

**Problem A.** Suppose you incur a \$2,000 debt to a credit card company. They charge you interest at a 15% nominal annual percentage rate and require a minimum monthly payment of \$50 (or the remaining balance, if it is less). However, often they will compound interest daily. For simplicity, let's suppose they compound continuously. Write an IVP to model your debt if you only pay the minimum monthly requirement (state clearly what all variables represent). Solve the IVP and use this to estimate (i) when you will have payed off this debt, and (ii) how much you will have payed in total.

**Problem B.** (Free fall with air resistance) Suppose you drop an object from a initial height  $h$ . A standard way to model free fall is with  $y'' = -g + \kappa(y')^2$ , where  $y(t)$  is the height at time  $t$ ,  $g$  is the earth's gravitational constant and  $\kappa > 0$  is the drag coefficient (air resistance). (The velocity square term comes from turbulence.) Solve for  $y(t)$ . Does this model have a terminal velocity? If so, what is it?