1. Determine an integrating factor for $xy' - 3x\sin(x) + 2y - x^2\cos(x) = 0$ and find some solution of this equation. Give this solution in explicit form.
2. We invest \$50000 in a bank where interest is compounded monthly at a rate of 6% a year. At the end of each month we withdraw \$100. Let $y_k$ be the amount of money on the account at the beginning of the $k$th month.
   (a) Find $y_1$ and $y_2$.
   (b) Find a difference equation for $y_k$.
   (c) Solve the resulting initial value problem.
   (d) Determine the amount of money in the account after ten years.
   (e) Will the money ever be gone? If so, when?
3. Solve the initial value problem $y'' - \frac{5}{2}y' + y = 0$, $y(0) = 0$, $y'(0) = 1$.
4. Consider the equation $y'' - y'\cos(t) - y\cosh(t) = 0$ (do not attempt to solve this equation). Let $y_1$ and $y_2$ be two solutions of this equation such that $y_1(0) = 0$, $y_1'(0) = 1$, and $y_2(0) = -2$.
   (a) Find the Wronskian of $y_1$ and $y_2$ evaluated at 0.
   (b) Find the Wronskian of $y_1$ and $y_2$ for any time $t$.
   (c) If $y_1(\frac{\pi}{2}) = 2$ and $y_1'(\frac{\pi}{2}) = 0$, determine the value of $y_2'(\frac{\pi}{2})$.
5. Given are the first two members of a sequence $y_0 = 0$ and $y_1 = 1$. Using two consecutive members, the next member of the sequence is constructed in the following way: You take the second one of these two numbers, multiply it by 5, divide it by 2, and then subtract the first one.
   (a) Find $y_2$, $y_3$, and $y_4$ (give the decimal respresentations of these numbers).
   (b) Find a difference equation that is satisfied by the members of this sequence.
   (c) Solve the resulting initial value problem.
   (d) Use the obtained formula to calculate $y_5$.
   (e) What is the limit of $\frac{y_{n+1}}{y_n}$ as $n$ tends to $\infty$?