1. The nontrivial linear combination $c_1 f(x) + c_2 g(x) + c_3 h(x) \equiv 0$ when $c_1 = -2k$, $c_2 = k$, $c_3 = k$, where k is any nonzero constant. (E.g., $c_1 = -2$, $c_2 = 1$, $c_3 = 1$ works.)

2. (a) Two steps of Euler's method yields $y(2) \approx y_2 = 2$.

   (b) Two steps of the Improved Euler's method yields $y(2) \approx y_2 = 35/16$.

3. (a) $y(x) = c_1 e^{2x} + c_2 e^{-2x} + c_3 \cos\sqrt{2}\,x + c_4 \sin\sqrt{2}\,x$

   (b) $y(x) = c_1 + c_2 x + c_3 x^2 + c_4 e^{-x}\cos 3x + c_5 e^{-x}\sin 3x$

4. $y(x) = \dfrac{4}{3}\,e^{-x} - \dfrac{2}{5}\,e^{-3x} + \dfrac{1}{15}\,e^{2x}$

5. $y(x) = c_1 e^{2x} + c_2 e^{-x} - \dfrac{9}{20}\cos 2x - \dfrac{3}{20}\sin 2x - \dfrac{4}{3}\,xe^{-x}$

6. The IVP $\dfrac{dv}{dt} = -kv^2$, $v(0) = 5$ has solution $v(t) = \dfrac{5}{1+5kt}$.
   Then find $k = 1/20$ and $v(2) = 10/3$ ft/s.