23. Determine whether or not each of the following equations is exact. If the equation is exact, find its solution.
    (a) $2x + 4y + (2x - 2y)y' = 0$;
    (b) $2x + 4y + (4x - 2y)y' = 0$;
    (c) $2x\sin(y) + x^2\cos(y)y' = 0$;
    (d) $2xy^2 + (2x^2y + \sqrt{x})y' = 0$;
    (e) $\mathrm{e}^x\sin(x) + \mathrm{e}^y\cos(y)y' = 0$;
    (f) $2x\mathrm{e}^y - 1 + (x^2\mathrm{e}^y + 1)y' = 0$.
24. Find explicitly the solution of the IVP $12xy + 3 + 6x^2y' = 0$, $y(1) = 1$.
25. Determine an integrating factor for the following equations and use it to find the solution:
    (a) $4x + 3y^2 + 2xyy' = 0$ (Hint: μ is depending on x only);
    (b) $xy^2 + y - xy' = 0$ (Hint: μ is depending on y only).
26. Find an integrating factor of the form $\mathrm{e}^{f(x,y)}$ for $M(x,y) + N(x,y)y' = 0$ in the following cases:
    (a) $\frac{M_y - N_x}{N}$ only depends on x;
    (b) $\frac{M_y - N_x}{M}$ only depends on y;
    (c) $\frac{M_y - N_x}{xM - yN}$ only depends on xy;
    (d) $\frac{M_y - N_x}{M - N}$ only depends on $x + y$.
27. Use the previous problem to find the solutions of the following problems:
    (a) $-2xy + (3x^2 - y^2)y' = 0$;
    (b) $\sin(x) - x\cos(x) - 3x^2(y - x)^2 + 3x^2(y - x)^2y' = 0$;
    (c) $3xy + 4x^2y^2 + (2x^2 + 3x^3y)y' = 0$;
    (d) $x + y - \frac{x^2}{y}y' = 0$;
    (e) $\cos(x) + (4y\mathrm{e}^{-y} + \sin(x))y' = 0$.
28. Find an integrating factor for:
    (a) The linear first order equation $y' - f(x)y - g(x) = 0$;
    (b) The separable first order equation $y' - f(x)g(y) = 0$.
29. Read Section 2.11 and work on problems 1–6 on page 106. These problems deal with Picard's iteration method.
30. Work on the problems on the back of this homework assignment. These problems deal with difference equations.