MATH 411, Spring 2001

Homework 1

Due: 30 January, 2001

R. Redheffer, *Differential Equations*:
[2.1]: 3, 5, 12, 13(a);
[2.2]: 3(c,e,f), 5, 6, 9;
[2.3]: 2, 4, 6 (for 6 see the definition of first integral on page 38);
[2.4]: 4, 5, 6 (for 6 read about Bernoulli equation on page 43).
Check that following equations are in exact differntial form and solve them.

$$\Big(2x + \frac{x^2+y^2}{x^2y}\Big)\,\mathrm{d}x = \frac{x^2+y^2}{xy^2}\,\mathrm{d}y, \tag{a}$$

$$\Big(\frac{\sin 2x}{y} + x\Big)\,\mathrm{d}x + \Big(y - \frac{\sin^2 x}{y^2}\Big)\,\mathrm{d}y = 0, \tag{b}$$

$$\Big(\sin y + y\sin x + \frac{1}{x}\Big)\,\mathrm{d}x + \Big(x\cos y - \cos x + \frac{1}{y}\Big)\,\mathrm{d}y = 0, \tag{c}$$

$$\frac{2x\,\mathrm{d}x}{y^3} + \frac{(y^2-3x^2)\,\mathrm{d}y}{y^4} = 0, \qquad y\Big|_{x=1} = 1. \tag{d}$$

All problems are estimated by 5 points, except 12 in [2.1], 3 in [2.2], 6 in [2.3], 6 in [2.4], d, which are estimated by 7 points.