

(Problems selected from worksheets by Rob Bayer and from Stewart's *Calculus*)

(1) Integrate each of the following:

(a)  $\int e^{x+e^x} dx.$

(b)  $\int \frac{\ln(x+1)}{x^2} dx.$

(c)  $\int \frac{t^3+1}{t^3-t^2} dt.$

(d)  $\int \sqrt{\frac{x-1}{x+1}} dx.$

(e)  $\int \frac{dt}{\sqrt{e^t}}.$

(f)  $\int \cos^3(2x) \sin(2x) dx$

(2) Find  $\frac{dy}{dx}$  using implicit differentiation.

(a)  $x^3 + y^3 = 1.$

(b)  $x^2 y^2 + x \sin y = 4.$

(c)  $2\sqrt{x} + \sqrt{y} = 3.$

(d)  $\sin x + \cos y = \sin x \cos y.$

(e)  $e^{x/y} = x - y.$

(f)  $y \sin(x^2) = x \sin(y^2).$

(3) Find  $y''$  in terms of  $x$  and  $y$  using implicit differentiation.

(a)  $9x^2 + y^2 = 9.$

(b)  $y' = x^2 y^2 + 5e^y.$

(c)  $\sqrt{x} + \sqrt{y} = 1.$

(d)  $y' + xy = x^2.$