

## Phys 3010 Mathematical Physics Assignment 12

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The differential equations below are all directly integrate-able if you rearrange. Try solving by hand, then using Maple to check your work. (Maple uses the function dsolve for differential equations.)

1. Find the solution to the differential equation

$$\frac{dy}{dx} = y^{3/2}$$

given that  $y=4$  when  $x=1$ .

2. Solve the differential equation  $3(t^2+1)dx + x^2dt = 0$ , given that  $x = 2/\pi$  when  $t = 1$ .
3. Solve the differential equation

$$x^2 \frac{dy}{dx} = 6y$$

given that  $x=1$  when  $y=1$ .

4. Solve the differential equation

$$\frac{d^2y}{dt^2} = 3 \frac{dy}{dt}$$

given that  $y=4$  at  $t=0$  and  $dy/dt=1$  at  $t=2$ . (Hint, first substitute  $v=dy/dt$ )

5. Solve the differential equation

$$\frac{dy}{dx} = xy + 4x - 2y - 8$$

given that  $y = -4$  when  $x = 4$ .