

## Math 310 HW #2

2.2] #14]  $y' = xy^3(1+x^2)^{-1/2}$   $y(0)=1$

$$\rightarrow y^{-3} dy = x(1+x^2)^{-1/2} dx$$

integrating;  $-\frac{1}{2y^2} = \sqrt{1+x^2} + C$  ; initial condition  $\Rightarrow C = -3/2$

$$\rightarrow \frac{1}{y^2} = 3 - 2\sqrt{1+x^2} \quad \text{implicit form.}$$

a) Explicit form:  $y(x) = \frac{1}{\sqrt{3-2\sqrt{1+x^2}}}$  (choose "+" root!)

b) See webpage

c) Solution not defined when  $2\sqrt{1+x^2} = 3 \Leftrightarrow x = \pm \frac{\sqrt{5}}{2}$ . So this solution is defined on  $(-\frac{\sqrt{5}}{2}, \frac{\sqrt{5}}{2})$ .

#20]  $y^2(1-x^2)^{1/2} dy = \arcsin x dx$ ,  $y(0)=1$ .

$$\rightarrow y^2 dy = \frac{\arcsin x}{\sqrt{1-x^2}} dx$$

integrate:  $\frac{y^3}{3} = \frac{1}{2} (\arcsin x)^2 + C$ . Initial condition  $\Rightarrow C = 0$ .

a) Explicit form:  $y(x) = \sqrt[3]{\frac{3}{2} (\arcsin x)^2}$

b) See webpage

c)  $\arcsin x$  is defined only for  $[-1, 1]$ , so solution defined only there.