Math 324 Quiz 10

29 June 2016

Name: Answer key

1. Find the general solution to $y' = \frac{x\sqrt{1+y^2}}{y\sqrt{1+x^2}}$

separable!

$$\int \frac{y}{\sqrt{1+y^2}}\,dy = \int \frac{x}{\sqrt{1+x^2}}\,dx$$

$\sqrt{1+y^2}$ $\qquad$ $\sqrt{1+x^2} + C$

$$y = \pm\sqrt{(\sqrt{1+x^2}+C)^2 - 1}$$

2. Find the general solution to $y' = \frac{-x^3-y^3}{3xy^2}$

$M = x^3+y^3 \qquad M_y = 3y^2$

$N = 3xy^2 \qquad N_x = 3y^2$ $\quad$ exact!

$f = \int M\,dx = \int x^3+y^3\,dx = \frac{1}{4}x^4 + y^3x + g(y)$

$= \int N\,dy = \int 3xy^2\,dy = xy^3 + h(x)$

$$\frac{1}{4}x^4 + xy^3 = C$$

$$y = \sqrt[3]{\frac{C - \frac{1}{4}x^4}{x}}$$