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Science

Math 281 Test 1
October 10th, 2003

Problem 1[5]. Evaluate

$$\int \frac{x}{(x^2 + 1)(x^2 + 3)} dx.$$

Problem 2[5]. Show that $\mu(x, y) = \frac{1}{x^2 + y^2}$ is an integrating factor for

$$(x^2 + y^2 + y)dx - xdy = 0.$$

Problem 3[7]. A curve C passes through $(2, 1)$ and has slope $\frac{2xy}{x^2 - y^2}$ at each point (x, y) (whenever $x^2 - y^2 \neq 0$). Find the equation for C .

Problem 4[7]. Solve

$$y' = \sqrt{x + y}.$$

Hint: Make the substitution $v^2 = x + y$.

Problem 5[6]. Suppose that the general solution of a differential equation is of the form $y = x + ax^2 + be^{-x}$, where a, b are parameters. Is it possible that $y_1 = -x + e^x$ is also a solution of the equation? Justify your answer.