MATH 166
SUMMER 2012
QUIZ 29

1. For this problem, we will consider the differential equation

$$(x^2+1)\frac{dy}{dx} = y.$$

a) (5 pt) Find a general solution for this equation.
b) (5 pt) Find the limit of this solution as $x \longrightarrow \pm\infty$.
c) (5 pt) Find the specific solution if we are also given that $y(0) = 5$.

2. For this problem, recall that

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}, -\infty < x < \infty.$$

a) (5 pt) Find a series for $f(x) = e^{-x^2}$.
b) (5 pt) Show that this series is a solution to the differential equation

$$\frac{dy}{dx} + 2xy = 0.$$

c) (5 pt) Separate the equation (like in #1) and find a general solution.