

# Calculus III - Quiz 5 - Spring 2015

March 19, 2015

Name: \_\_\_\_\_

1. (10 points) Compute the integral

$$\iint_D e^{-x^2-y^2} dA,$$

where  $D$  is the disk centered at  $(0,0)$  of radius  $R$ .

**Solution:** In polar coordinates the integrand becomes

$$e^{-r^2},$$

so we can write the integral as

$$\int_0^{2\pi} \int_0^R e^{-r^2} r dr d\theta.$$

The integral with respect to  $\theta$  is easy since there is no dependence on this variable. So we reduce to finding

$$2\pi \int_0^R e^{-r^2} r dr.$$

But after a  $u$ -substitution this becomes

$$\pi(1 - e^{-R^2}).$$