

MA 302: Review 4

Name: _____

This review concerns the change of variables theorem. You should review it in Section 5.5 of our text.

- (1) State the Change of Variables Theorem and explain all of the terms in its statement.
- (2) To change from polar coordinates to rectangular coordinates, we use the change of variables function $H(r, \theta) = \begin{pmatrix} r \cos \theta \\ r \sin \theta \end{pmatrix}$. Let D be the unit disc in the xy plane. Let $f(x, y) = x^2 + y^2$.
 - (a) What is region E in the $r - \theta$ plane such that $H(E) = D$?
 - (b) By the text's definition, the determinate of the derivative DH is called the "Jacobian". What is the Jacobian of the polar change of coordinates function H ?
 - (c) Use the change of variables theorem to calculate $\iint_D f dA$.