

NAME: _____

Panther ID: _____

Take-home Quiz 6 - Due Tue. April 17

MAC 2313, Spring 2012

To receive credit you **MUST SHOW ALL YOUR WORK**. Answers which are not supported by work will not be considered.

1. (8 pts) Consider the surface σ given as the graph of the function $z = f(x, y)$, where $(x, y) \in \mathcal{R}$ is a region in the xy -plane. Derive formula (2) for surface area on p. 1027 textbook

$$S = \int \int_{\mathcal{R}} \sqrt{\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 + 1},$$

from the general formula (12) on p. 1035.

Hint: Such a surface has the obvious parametrization $x = u, y = v, z = f(u, v)$, or $\mathbf{r}(u, v) = \langle u, v, f(u, v) \rangle$, with $(u, v) \in \mathcal{R}$.

2. (16 pts) (a) Find the surface area of the part of the sphere $x^2 + y^2 + z^2 = (2a)^2$ bounded between the planes $z = 0$ and $z = a$. (a is a positive constant)

(b) Find the centroid of the surface in part (a).