Homework Assignment for Week 16

1. Section 16.5: Problems 5, 11, 13, 19, 31, 33, 49, 51, 55, 56.

   Hints and Remarks:

   Problems 5-19: Among other choices, most of the parametrizations can be chosen as $x(r,\theta) = r\cos\theta$, $y(r,\theta) = r\sin\theta$ and $z(r,\theta) = f(x(r,\theta), y(r,\theta))$, or $\boldsymbol{r} = \boldsymbol{r}(\theta,\phi)$ as in spherical coordinate with ρ fixed as a constant.

   In problem 33, it is more consistent with the spherical coordinate in the textbook to interchange $\sin\phi$ and $\cos\phi$ in $\boldsymbol{r}(\theta,\phi)$, then proceed (the answer will be different after the interchange).

   Also note that the parameters (θ,ϕ) in $\boldsymbol{r}(\theta,\phi)$ are different from the angles in spherical coordinates (neither before nor after the above mentioned interchange). A similar case is the parametrization $x = a\cos\tilde{\theta}$, $y = a\sin\tilde{\theta}$ for the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$. Here $\tilde{\theta}$ is not the same θ in polar coordinate which satisfies $\tan\theta = \dfrac{y}{x}$.

   Problem 51: Read Example 8 and show that $d\sigma = \sqrt{2}dA$. A similar (slightly different) formula also applies to problem 49.

2. Section 16.6: Problems 17, 19, 21, 25, 35, 37.

3. Section 16.7: Problems 1, 3, 6, 7, 13, 17, 19, 23, 28.