Math 53 Discussion

Practice Problems: 16.6–16.7, parametric surfaces and flux

1)[*from Mon.*] What surface has vector equation $\overrightarrow{r}(s,t) = \langle s\sin(2t), s^2, s\cos(2t)\rangle$?

2)[*from Mon.*] Find a parametric representation for the part of the ellipsoid $x^2+2y^2+3z^2=1$ that lies to the left of the xz-plane.

3)[*from Mon.*] Find the area of the surface with parametric equations $x=u^2$, $y=uv$, $z=\frac{1}{2}v^2$ for $0\le u\le 1$ and $0\le v\le 2$.

Over →

4)[*from Mon.*] Set up the integral for finding the area of the part of the surface $y = 4x + z^2$ that lies between the planes $x = 0$, $x = 1$, $z = 0$, $z = 1$.

5) Evaluate the surface integral $\int\int_S y dS$ where S is the part of the paraboloid $y = x^2 + z^2$ that lies inside the cylinder $x^2 + z^2 = 4$.

6) Evaluate the flux of $\overrightarrow{F}(x, y, z) = xze^y\ \hat{\mathbf{i}} - xze^y\ \hat{\mathbf{j}} + z\ \hat{\mathbf{k}}$ across the surface S consisting of the part of the plane $x + y + z = 1$ in the first octant and with downward orientation.

Answers: 1) paraboloid along y-axis. 2) $(\sin\phi\cos\theta, \frac{1}{\sqrt{2}}\sin\phi\sin\theta, \frac{1}{\sqrt{3}}\cos\phi)$, $0 \le \phi \le \pi$, $\pi \le \theta \le 2\pi$. 3) 4. 4) $\int_0^1\int_0^1 \sqrt{17 + 4z^2}dxdz = \int_0^1 \sqrt{17 + 4z^2}dz$. 5) $\frac{\pi}{16}\left[\frac{2}{5}u^{5/2} - \frac{2}{3}u^{3/2}\right]_1^{17} = \frac{\pi}{60}(391\sqrt{17}+1)$. 6) $-1/6$.