Binghamton University	Spring 2020
Math 323	Problem Set 16.9

5-15 Use the Divergence Theorem to calculate the surface integral $\iint_S \mathbf{F} \cdot \mathbf{S}$; that is, calculate the flux of $\mathbf{F}$ across S

7. $\mathbf{F}(x, y, z) = \langle 2xy^2, xe^z, z^3 \rangle$, S is the surface of the solid bounded by the cylinder $y^2 + z^2 = 1$ and the planes $x = -1$ and $x = 2$
9. $\mathbf{F}(x, y, z) = \langle xe^y, z - e^y, -xy \rangle$, S is the ellipsoid $x^2 + 2y^2 + 3z^2 = 4$
11. $\mathbf{F}(x, y, z) = \langle 2x^3 + y^3, y^3 + z^3, 3y^2 z \rangle$, S is the surface of the solid bounded by the paraboloid $z = 1 - x^2 - y^2$ and the xy-plane
13. $\mathbf{F} = |\mathbf{r}|\mathbf{r}$, where $\mathbf{r} = \langle x, y, z \rangle$, S consists of the hemisphere $z = \sqrt{1 - x^2 - y^2}$ and the disk $x^2 + y^2 \leq 1$ in the xy-plane

17. Use the Divergence Theorem to evaluate $\iint_S \mathbf{F} \cdot d\mathbf{S}$, where $\mathbf{F}(x, y, z) = \langle z^2 x, y^3/3 + \tan z, x^2 z + y^2 \rangle$ and S is the top half of the sphere $x^2 + y^2 + z^2 = 1$.