Problems: Flux Through a Paraboloid

Consider the paraboloid $z = x^2 + y^2$. Let $S$ be the portion of this surface that lies below the plane $z = 1$. Let $\mathbf{F} = x\mathbf{i} + y\mathbf{j} + (1 - 2z)\mathbf{k}$.

Calculate the flux of $\mathbf{F}$ across $S$ using the outward normal (the normal pointing away from the z-axis).