Maple 2: Integration Variation

Reduce the following problems to integrals that can be solved with Maple. Then use Maple to compute the answer. Turn in this document with the answers copied from Maple on or before the last day of finals.

1. Find the length of the parabola $y = x^2$ as x goes from 0 to 2.

2. $\int_C x^2 - y + 3z\,ds$ where C is a line segment given by $r(t) =< t,2t,3t >$, $0 \le t \le 1$

3. Find the surface area of the surface $z = 1 - x^2 - y^2$ above the disk $x^2 + y^2 \le 1$

4. $\iint_S (x + z)\,dS$ where S is the first-octant portion of the cylinder $y^2 + z^2 = 9$ between x = 0 and x = 4

5. Find the flux of the vector field $F(x, y, z) =< x, y, z >$ through the surface given by potion of the paraboloid $z = 4 - x^2 - y^2$ that lies above the xy-plane. Note that this surface is not closed.

6. In the previous problem, would it be easier if we considered the same surface as before, but joined with the disk of radius 2 in the xy plane so that the surface would be a closed surface?

7. If $F(x, y, z) =< x, y, z >$, find $\iint_S \vec{F} \cdot \vec{N}\,dS$ where S is the surface of the solid region Q bounded by the coordinate planes and the plane $2x + 3y + 4z = 12$