

Math 53 Discussion Problems Dec 3

1. Calculate $\iint_S f dS$ for the given surface S and function f .
 - (a) $S =$ the parabolic cylinder $y = x^2, 0 \leq x \leq 2, 0 \leq z \leq 3$,
 $f(x, y, z) = x$
 - (b) $S =$ triangular surface with vertices $(1, 0, 0), (0, 2, 0), (0, 1, 1)$, $f(x, y, z) = xyz$
 - (c) $S =$ boundary of the wedge in the first octant bounded by the coordinate planes and the planes $x = 2$ and $y + z = 1$, $f(x, y, z) = y + z$
2. Calculate $\iint_S \mathbf{F} \cdot d\mathbf{S}$ for the given oriented surface S and vector field F .
 - (a) $S =$ portion of the sphere $x^2 + y^2 + z^2 = 4$, \mathbf{n} points away from the origin, $F(x, y, z) = z\mathbf{k}$
 - (b) $S =$ the cone $z = 2\sqrt{x^2 + y^2}, 0 \leq z \leq 2$, \mathbf{n} points away from the z -axis, $F(x, y, z) = y^2\mathbf{i} + xz\mathbf{j} - \mathbf{k}$
 - (c) $S =$ portion of the cylinder $x^2 + y^2 = 1$ cut by the planes $z = 0, z = 1$, \mathbf{n} points outwards, $F(x, y, z) = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$