Surface Integrals of Vector Fields

1. For the surface given by the parametric equation

$$r(u,v) =< u^2+1, \ln v, uv >,\ 0 \le u \le 2, 1 \le v \le 2$$

   (a) Calculate $r_u \times r_v$.

   (b) Which way is $r_u \times r_v$ at the values $u = 0, v = 1$ pointing?

   (c) Setup an integral to evaluate $\int_S \mathbf{F} \cdot d\mathbf{S}$, where S is as above, and

$$\mathbf{F} = y\mathbf{i} + x\mathbf{j} - z\mathbf{k}$$

   (assume S is oriented outwards).