1) Let \( (x, y) = \mathbf{r}'(t) = (e^t \mathbf{i} - e^{-t} \mathbf{j}) \); let \( f(x, y) = xy \).

a) Write the tree diagram for \( f(\mathbf{r}'(t)) \)

b) Write the chain rule for \( \frac{df}{dt} \).

c) Use the chain rule to compute \( \frac{df}{dt} \)

d) Now plug \( \mathbf{r}'(t) \) directly into \( f \), and use that formula to compute \( \frac{df}{dt} \).

2) Same as above, but with \( f(x, y) = y^2 - x^2 \); \( \mathbf{r}'(t) = (s, u) \) and \( s = t + \frac{1}{t} \); \( u = t - \frac{1}{t} \).