Line Integrals

1. Evaluate
$$\int_C x^2 y + y^2 \, ds$$
where C is the two-dimensional curve with parametrization
$$r(t) = (2t, 3t), \ 0 \le t \le 1.$$

2. Evaluate
$$\int_C x e^z \, dy$$
where C is the three-dimensional curve with parametrization
$$r(t) = (t, 4t, t^2), \ 0 \le t \le 2.$$

3. Setup an expression to evaluate
$$\int_C \cos(x) \sin(y) \, ds$$

for C the curve which is the line segment from $(1, 2)$ to $(-2, 4)$ followed by the curve $y = x^2$ from $(-2, 4)$ to $(3, 9)$, but do not evaluate the integral.