Exercises: Path Independence of Line Integral 2

Judge if the following line integrals are path independent. If so, calculate the integral on a curve from point $(0, 0)$ to point $(1, 1)$ in 2d, or from point $(0, 0, 0)$ to point $(1, 1, 1)$ in 3d.

Problem 1. $\int_C 2e^{x^2}(x\cos(2y)\,dx - \sin(2y)\,dy)$.

Problem 2. $\int_C (x^2y\,dx - 4xy^2\,dy + 8z^2x\,dz)$.

Problem 3. $\int_C (e^y\,dx + (xe^y - e^z)\,dy - ye^z\,dz)$.

Problem 4. $\int_C (4y\,dx + (4x + z)\,dy + (y - 2z)\,dz)$.