1. The path $C$ consists of four separate line segments from point $A$ to $B$ to $C$ to $D$ to $E$, in that order, where the points are given below:

$A = (0, 1, 1), \quad B = (1, 0, 0), \quad C = (0, 3, 4), \quad D = (-1, 2, 3), \quad E = (2, 1, 1)$

A particle travels along $C$ in the force field $F = \langle 3x^2z^2, 6yz, 2x^3z + 3y^2 \rangle$. Calculate the net work done by $F$ on the particle.

*Hint:* That sure does seem like a lot of work if you calculate the integral directly! Is there an easier way? Perhaps you should first check whether $F$ is conservative?

value of integral: __________________