Gradient Theorem

Let $\phi(\boldsymbol{r}) = x^2y + xy^2 + z$.

(a) Compute $\boldsymbol{\nabla}\phi$.

(b) Compute $\int_C \boldsymbol{\nabla}\phi \cdot d\boldsymbol{r}$ from $(0, 0, 0)$ to $(1, 1, 1)$ using the gradient theorem.

(c) Compute $\int_C \boldsymbol{\nabla}\phi \cdot d\boldsymbol{r}$ along the lines segments $(0, 0, 0)$ to $(1, 0, 0)$to $(1, 1, 0)$ to $(1, 1, 1)$.