Problem (20 points) $C$ is a circle, which is the positively oriented boundary of the paraboloid $M$ given by $z = x^2 + y^2$ and $z \leq 4$, use Stokes’ theorem to evaluate the following closed line integral:

$$\oint_C \overrightarrow{F} \cdot d\overrightarrow{r}$$

where $\overrightarrow{F} = \begin{bmatrix} -xz \\ yz \\ (z+1)e^z \end{bmatrix}$. (Hint: $2\sin(x)\cos(x) = \sin(2x)$)