$$\begin{aligned}\text{curl}\mathbf{F} &= \nabla \times \mathbf{F} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ \partial/\partial x & \partial/\partial y & \partial/\partial z \\ e^z & 9 & xe^z \end{vmatrix} \\ &= (0-0)\,\mathbf{i} - (e^z - e^z)\,\mathbf{j} + (0-0)\,\mathbf{k} = \mathbf{0}\end{aligned}$$

$\mathbf{F}$ is defined on all of $\mathbb{R}^3$ with component functions that have continuous partial deriatives, so $\mathbf{F}$ is conservative. Thus there exists a function f such that $\nabla f = \mathbf{F}$. Then $f_x(x,y,z) = e^z$ implies $f(x,y,z) = xe^z + g(y,z)$ $\Rightarrow$ $f_y(x,y,z) = g_y(y,z)$. But $f_y(x,y,z) = 9$, so $g(y,z) = 9y + h(z)$ and $f(x,y,z) = xe^z + 9y + h(z)$. Thus $f_z(x,y,z) = xe^z + h'(z)$ but $f_z(x,y,z) = xe^z$, so $h(z) = K$, a constant. Hence a potential function for $\mathbf{F}$ is $f(x,y,z) = xe^z + 9y + K$.