Directions: Answer each question. Simplify. (8 points)

1. (4 points) Given $z = 24xe^y - 7ye^{-x}$. Find $\frac{\partial^2 z}{\partial x \partial y}$.

\[
\frac{\partial^2 z}{\partial x \partial y} = 24xe^y - 7e^{-x}
\]

2. (4 points) Find the equation of a tangent plane to the surface given by $f(x, y) = \ln(e^{2x^6y^4})$ at the point $(1, -1, f(1, -1))$.

\[
f(x, y) = 2 + 6\ln x + 4\ln y
\]

\[
f(1, -1) = 2
\]

\[
f_x = \frac{6}{x} \Rightarrow 6, \quad f_y = \frac{4}{y} \Rightarrow -4
\]

\[
z = 2 + 6(x-1) - 4(y+1)
\]

\[
= 2 + 6x - 6 - 4y - 4
\]