1. Find the tangent plane to the surface $z = x \ln(y) + x^2 y + 2$ at the point $(x, y, z) = (2, 1, 6)$.

Work:

Answer: $z =$

2. Find the linear approximation of the function $f(x, y) = \sqrt{xy^2 + 2}$ at the point $(x, y) = (2, 1)$ and use it to estimate $f(2.02, 0.99)$.

Work:

Answers: $L(x, y) =$ $f(2.02, 0.99) \simeq$

3. Given that $w = \ln(x^2 + y + z^2)$, $x = \cos(s)$, $y = \dfrac{s}{\pi t}$ and $z = t$, use the Chain Rule to find $\dfrac{\partial w}{\partial t}$ and $\dfrac{\partial w}{\partial s}$ at the point where $t = 1$ and $s = \pi$.

Work:

Answers: $\dfrac{\partial w}{\partial t} =$ $\qquad\qquad\qquad\qquad$ $\dfrac{\partial w}{\partial s} =$

4. Determine $\dfrac{\partial z}{\partial x}$ and $\dfrac{\partial z}{\partial y}$ if z is given implicitly as a function of x and y by the equation $xy^2 + xe^z = z^2$.

Work:

Answers: $\dfrac{\partial z}{\partial x} =$ $\qquad\qquad\qquad\qquad$ $\dfrac{\partial z}{\partial y} =$