Calculus 251:C3 Worksheet 14.6

(1) Find an equation of the plane tangent to the graph of f at the indicated point.

(a) $f(x,y) = 3x^2y - x^3y^2$ at $(-1,1)$

(b) $f(x,y) = ye^{x/y}$ at $(\ln(2),2)$

(2) Use a linear approximation to estimate the value of $\sqrt{\dfrac{9.2}{3.9}}$.

(3) Let $f(x,y) = 3x^2 - xy - y^2 - 18x$. Find all points on the graph of $z = f(x,y)$ where the tangent plane is parallel to the indicated plane.

(a) the xy-plane

(b) the plane $2x - 5y + 2z = 1$

(4) Find parametric equations for the line tangent to the curve of intersection of the surfaces $x^2 + y^2 = 4$ and $x^2 + y^2 = z$ at the point $(\sqrt{2}, \sqrt{2}, 4)$.

(5) Estimate the change in the value of $f(x,y,z) = \ln(\sqrt{x^2 + y^2 + z^2})$ as the point P moves from $P_0 = (3,4,12)$ a distance of 0.1 units in the direction of $3\hat{\mathbf{i}} + 6\hat{\mathbf{j}} - 2\hat{\mathbf{k}}$.