

1. (3,2,5 pts) Consider the function $f(x, y) = \sqrt{y^2 - x}$.
 - (a) Find and sketch the domain.
 - (b) Find the range.
 - (c) Sketch a contour map of f showing at least three level curves.
2. (4,4,2 pts) Consider a function $f(t, r)$ representing the price of sushi as a function of time, t , and distance from the ocean, r .
 - (a) Explain in words the meaning of $\frac{\partial f}{\partial t}$.
 - (b) Give the anticipated sign of $\frac{\partial f}{\partial t}$ and $\frac{\partial f}{\partial r}$ and explain your reasoning for both.
 - (c) If $f(t, r) = e^{2t}(1 - r^2)$, compute $f_t(1, \frac{1}{4})$ and $f_r(1, \frac{1}{4})$.
3. Find the equation of the plane tangent to the surface $z = f(x, y) = y^3x^{1/2}$ at a general point $P = (a, b, f(a, b))$.