

HW 3
Math 261, F18

Please see the course syllabus for details on how to turn in your homework assignments. This one is due at the beginning of your class on **Friday, September 21**.

1. If $f(x, y, z) = \sqrt{x^3 + \sin(y) - y \ln(z)}$, find $f(2, \frac{\pi}{2}, 1)$. Perform elementary simplifications.
2. Sketch the domain of $g(x, y) = \ln(1 - 2x - 2y)$.
3. Let $h(x, y, z) = 3x^2z + z \cos(\pi y - \pi x) + 3e^z$. Determine $\lim_{(x,y,z) \rightarrow (1,2,0)} h(x, y, z)$.
4. The function $k(x, y) = \frac{7x^8y}{-2x^9 + 9y^9}$ has no limit as $(x, y) \rightarrow (0, 0)$.

Show this by computing the limit of the function along the two following paths:

- (a) $t \mapsto (t, 0)$. This notation indicates the path $(x(t), y(t)) = (t, 0)$, or equivalently, the path given by $y = 0$.
- (b) $t \mapsto (t, t)$. This notation indicates the path $(x(t), y(t)) = (t, t)$, or equivalently, the path given by $y = x$.

Note (and hint): the nice thing about the parametric notation for the paths $t \mapsto (f(t), g(t))$ is that it suggests what you should do to compute the limit along the path: plug in the function $f(t)$ for x , the function $g(t)$ for y , and then take the limit as $t \rightarrow 0$.

5. Compute $\frac{\partial h}{\partial x}$ for the function in #3.