

Preliminary Homework
Assigned Friday, November 8

Note: Preliminary homework is always graded credit or no credit. **You get full credit for completing the assignment, whether or not your answers are correct.** The purpose of preliminary homework is to start you thinking about the topic of the next class.

You may use your preliminary homework in activities with your classmates. You should be sure to think about these questions so you will be prepared.

Preliminary homework is always due at the *beginning* of class.

Assignment: Let $f(x, y) = ax + by + d$, and let S be the graph of f .

Note that S is a plane.

- Two points P and Q lie on S . The coordinates of P are (x, y, z) and the coordinates of Q are $(x + \Delta x, y + \Delta y, z + \Delta z)$. Find Δz as a function of Δx and Δy .

$$\Delta z = \boxed{}$$

- Express \overrightarrow{PQ} as the sum of two vectors, \vec{w}_H horizontal (with z -component equal to 0) and \vec{w}_V vertical (with x - and y -components equal to 0).

$$\vec{w}_H = \boxed{} \quad \vec{w}_V = \boxed{}$$

- If $\langle \Delta x, \Delta y \rangle = h \langle \cos \theta, \sin \theta \rangle$, find the “slope” of \overrightarrow{PQ} as

$$\text{slope} = \frac{|\vec{w}_V|}{|\vec{w}_H|} = \boxed{}$$

- Your answer should be equal to

$$\langle a, b \rangle \cdot \langle \cos(\theta), \sin(\theta) \rangle.$$

Is it?

- Explain why this is a kind of partial derivative of f , in the direction given by the unit vector $\langle \cos(\theta), \sin(\theta) \rangle$.