

## Math 252 Quiz 11 (Problems)

1. Using  $f(x, y) = 3x^2 + 4y^2$ ,  $P(4, -2)$  and  $Q(10, 6)$ :
  - a. Find the gradient of  $f$  at  $P$ .
  - b. Find the directional derivative of  $f$  at  $P$  in the direction from  $P$  to  $Q$ .
  - c. Find the maximum value of the directional derivative of  $f$  at  $P$ .

## Math 252 Quiz 11 (Answers)

1.    a.  $\nabla f(P) = \langle 24, -16 \rangle$   
      b.  $\mathbf{u} = \frac{1}{\|\overrightarrow{PQ}\|} \overrightarrow{PQ}$ ;  $D_{\mathbf{u}}f(P) = \nabla f(P) \cdot \mathbf{u} = \frac{16}{10}$   
      c.  $\|\nabla f(p)\| = 8\sqrt{13}$