

**Partial Differentiation**  
***Limits***

**Question**

Evaluate the given limit. If the limit does not exist, explain why.

$$\lim_{(x,y) \rightarrow (1,2)} \frac{2x^2 - xy}{4x^2 - y^2}$$

**Answer**

The fraction is not defined on points of the line  $y = 2x$ .

Therefore it cannot have a limit at  $(1, 2)$ . But cancelling  $2x - y$  gives

$$\lim_{(x,y) \rightarrow (1,2)} \frac{2x^2 - xy}{4x^2 - y^2} = \lim_{(x,y) \rightarrow (1,2)} \frac{x}{2x + y} = \frac{1}{4}$$