

## Quiz 3

B Term, 2018

Show all work needed to reach your answers. Please compute each limit or explain why it does not exist. Each limit is worth 6 points; there is 1 free point.

#3f  
§10.2  
p.446

1.  $\lim_{(x,y) \rightarrow (0,0)} \frac{xy(x-y)}{x^2+y^2}$

$\downarrow$  polar  $\lim_{r \rightarrow 0} \frac{r^3 \cos \theta \sin \theta (\cos \theta - \sin \theta)}{r^2} = 0$   
Cancel: (+1) (+2)

High: 25  
Median: 22  
Low: 19

Limit Value:

0

#5g  
§III  
p.72

2.  $\lim_{\substack{(x,y) \rightarrow (1,3) \\ y \neq 3x}} \frac{27x^3 - y^3}{9x^2 - y^2}$

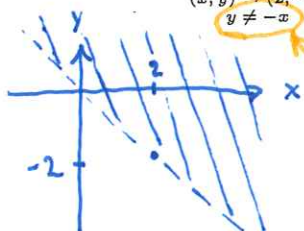
$\downarrow$  factor  $\lim_{\substack{(x,y) \rightarrow (1,3) \\ y \neq 3x}} \frac{(3x-y)(9x^2+3xy+y^2)}{(3x-y)(3x+y)} = \lim_{(x,y) \rightarrow (1,3)} \frac{9x^2+3xy+y^2}{3x+y} = \frac{27}{6}$   
Cancel: (+1) (+2)

Limit Value:

 $\frac{27}{6} = \frac{9}{2}$ 

3.  $\lim_{\substack{(x,y) \rightarrow (2,-2) \\ y \neq -x}} \frac{x+y}{\sqrt{x^2-y^2}}$

$\downarrow$   $\lim_{\substack{(x,y) \rightarrow (2,-2) \\ y \neq -x}} \frac{x+y}{\sqrt{(x+y)(x-y)}} = \lim_{\substack{(x,y) \rightarrow (2,-2) \\ y \neq -x}} \sqrt{\frac{x+y}{x-y}} = 0$   
Cancel: (+1) (+2)



Needs to be  
 $y > -x$

Limit Value:

0

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

$\downarrow$   $\lim_{y \rightarrow 1} \frac{1}{y} \left( \lim_{\substack{(x,y) \rightarrow (1,1) \\ xy \neq 1}} \frac{e - e^{xy}}{1 - xy} \right) = 1 \cdot \lim_{u \rightarrow 1} \frac{e - e^u}{1 - u}$   
"0/0"  
 $\downarrow$  L'Hôpital  $\lim_{u \rightarrow 1} \frac{-e^u}{-1} = e$   
(+1) (+1)

Limit Value:

e