Math 101 , quiz 1
September 24, 2012, Section 10

Name : _____
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QUESTION: *Determine whether the statement is true or false. If it is true, explain why? If it is false, explain why or give an example that disproves the statement*

1. If f is a function, then $f(3x) = 3f(x)$. FALSE
Explanation: (By a counter example) Let $f(x) = x^2$. Since $f(3x) = 9x^2$ then $9x^2 = 3x^2$ which is not valid for all values of x.

2. $\lim_{x\to 1}\left(\frac{x^2+6x-7}{x^2+5x-6}\right) = \frac{\lim_{x\to 1}(x^2+6x-7)}{\lim_{x\to 1}(x^2+5x-6)}$. FALSE
Explanation: By the **limit quotient rule** $\lim_{x\to a}\frac{f(x)}{g(x)} = \frac{\lim_{x\to 1} f(x)}{\lim_{x\to 1} g(x)}$ if $\lim_{x\to 1} g(x) \neq 0$

3. If $\lim_{x\to 5} f(x) = 2$ and $\lim_{x\to 5} g(x) = 0$, then $\lim_{x\to 5}\left(\frac{f(x)}{g(x)}\right)$ does not exist. TRUE
Explanation: By the **limit quotient rule**

4. If $\lim_{x\to 5}[f(x)g(x)]$ exists, then the limit must be $f(5)g(5)$. FALSE
Explanation: (i) Assuming that f and g have limits as x approaching 5. Then we can write, by the **limit product rule**, $\lim_{x\to 5}[f(x)g(x)] = \lim_{x\to 5} f(x) \quad \lim_{x\to 5} g(x)$, but in general $\lim_{x\to 5} f(x) \neq f(5)$ hence the statement is wrong. (ii) If any one of the functions does not have limit as x approaching 5 then the by the **limit product rule** we can write $\lim_{x\to 5}[f(x)g(x)] = \lim_{x\to 5} f(x) \quad \lim_{x\to 5} g(x)$

5. If $\lim_{x\to 0} f(x) = \infty$ and $\lim_{x\to 0} g(x) = \infty$, then $\lim_{x\to 0}[f(x) - g(x)] = 0$. FALSE
Explanation: **Limit difference rule** can not be applied here because the limits of the functions $f(x)$ and $g(x)$ do not exist as x approaching 0.