

Quiz 2: MAC 2311, July 16

Name:

Email Id:

Attempt all questions. Show as many steps as possible to get partial credit.

1. Let $f(x) = \lfloor x \rfloor$, where $\lfloor x \rfloor$ denotes the floor function of x (it is the greatest integer less than or equal to x). Examples: $\lfloor 2.03 \rfloor = 2$, $\lfloor 2.99999 \rfloor = 2$, $\lfloor -4.3 \rfloor = -5$. Evaluate the following limits if they exist and give reasons if they don't. (1) $\lim_{x \rightarrow 1^-} f(-x)$. (2) $\lim_{x \rightarrow 1^+} f(-x)$. (3) $\lim_{x \rightarrow 1} f(-x)$. (4) $\lim_{x \rightarrow 1.6^-} f(-x)$ [**2 x 4 = 8 points**]

2. Evaluate $\lim_{x \rightarrow 2} \frac{\sqrt{6-x}-2}{\sqrt{3-x}-1}$. [**6 points**]

3. Sketch the graph of $y = 2 - \tan^{-1}(-2x)$. [6 points]

4. Simplify the expression $\sin(\tan^{-1} x)$ (eliminate the trigonometric functions) [HINT: Put in $y = \tan^{-1} x$. Consider laws like $\sin^2 x + \cos^2 x = 1$ and $\tan^2 x + 1 = \sec^2 x$]. [6 points]

5. (a) Find the domain and the range of the function $\cos^{-1}(4x + 5)$. (b) Is it true that $\tan^{-1} x = \frac{\sin^{-1} x}{\cos^{-1} x}$? Justify or give a counter-example. **[2+2 = 4 points]**

6. Consider a function $f(x) = \frac{2-|x|}{2+x}$. Do you think $\lim_{x \rightarrow -2} f(x)$ exists? If so, find its value. If not, why not? **[6 points]**