## 7.13 Annexure 3A: Tutorial worksheet

**MATH 105: Augmented Quantitative Methods 1**

**Tutorial 7**: Thursday, 11 April 2013

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1. Let $f(x) = 2x - 6$. Evaluate $\lim_{x\to 3^+} f(x)$, $\lim_{x\to 3^-} f(x)$ and $\lim_{x\to 3} f(x)$.
2. Find $\lim_{x\to 4^+} \sqrt{x-4}$ and $\lim_{x\to 4^-} \sqrt{x-4}$, if it exists.
3. Let $f(x) = \begin{cases} x-3 & \text{if} \quad x \leq 2, \\ x & \text{if} \quad x > 2. \end{cases}$ Find:
   (a) $\lim_{x\to 2^+} f(x)$,
   (b) $\lim_{x\to 2^-} f(x)$,
   (c) $\lim_{x\to 2} f(x)$, if it exists.
   (d) Is $f$ continuous at $x = 2$?
4. Identify all values of $x$ for which the function $f(x) = \frac{1}{x^2-4x+3}$ is discontinuous.
5. Given that the function $f(x) = \begin{cases} x+2 & \text{if} \quad x \leq 1, \\ kx^2 & \text{if} \quad x > 1, \end{cases}$ is continuous at $x = 1$, determine the value of $k$.
6. Let $f(x) = \begin{cases} x^2-2 & \text{if} \quad x \leq 2, \\ ax-b & \text{if} \quad 2 < x \leq 4, \\ 4 & \text{if} \quad x > 4. \end{cases}$ Given that $f$ is continuous for all $x$, find $a$ and $b$.
7. Let $y = f(x) = x^2 + x$.
   (a) Find the average rate of change of $y$ with respect to $x$ in the interval from $x = 2$ to $x = 3$.
   (b) Find the instantaneous rate of change of $y$ at $x = 2$.
   (c) Use part (b) to find the equation of the tangent line to the graph of $f$ at $(2, 6)$.
8. Tutorial test at 10am.

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