Queen Mary
University of London

MTH4100   **Calculus 1, Autumn 2012**
Exercise sheet 8   **Prof. Bill Jackson**

(*)1. Find the following limits:

(a) $\displaystyle\lim_{x\to 2}\frac{\sqrt{x^2+12}-4}{x-2}$ [2007 exam question]

(b) $\displaystyle\lim_{x\to 0}\frac{1-\cos(6x)}{36x^2}$ [2008 exam question]

(c) $\displaystyle\lim_{x\to\infty}\frac{\sqrt{x+5}}{\sqrt{x}+5}$

2. Consider the function $f(x) = x$ over the interval $[0,1]$. Estimate the area under the graph by subdividing the interval into n equal subintervals, and calculating the *upper* sum $A_n = \displaystyle\sum_{k=1}^{n} f(c_k)\Delta x$, for (i) $n = 2$, (ii) $n = 4$, and (iii) general n.

3. Evaluate the finite sums:

(a) $\displaystyle\sum_{j=2}^{4}\frac{(-1)^{j-1}}{j-1}$

(b) $\displaystyle\sum_{k=1}^{n}(k+2)(k-1)$