This homework sheet is due in class on Friday 19 January 2018 (week 2). All the requirements in the sheet on general instructions for homework apply. In particular, show your work (unlike WeBWorK), give exact answers (not decimal approximations), and use correct notation. (See the web page on notation.)

For the first several problems, recall “summation notation”. Examples:

\[
\sum_{k=0}^{3} \arctan(k) = \arctan(0) + \arctan(1) + \arctan(2) + \arctan(3)
\]

and

\[
\sum_{l=4}^{n} l^2 = 4^2 + 5^2 + \cdots + n^2.
\]

(Here is the right hand side of the second one with a few more terms: \(4^2 + 5^2 + 6^2 + \cdots + (n-1)^2 + n^2\).)

1. (3 points.) Write the expression

\[
\sin(1) + \sin(2) + \sin(3) + \sin(4) + \sin(5) + \sin(6) + \sin(7)
\]

using summation notation.

2. (3 points.) Write the expression \(\sum_{k=2}^{3} \cos(k)\) using summation notation.

3. (3 points.) Write the expression \(\sum_{k=-2}^{3} e^k\) without using “\(\sum\)”.

4. (3 points.) Write the expression \(\sum_{k=1}^{n} k^3\) without using “\(\sum\)”.

5. (6 points.) Use summation notation to write the Riemann sum which approximates \(\int_{0}^{2} \cos(x) \, dx\) with 7 equal length intervals and using right endpoints.

6. (6 points.) Use summation notation to write the Riemann sum which approximates \(\int_{0}^{2} \arctan(x) \, dx\) with \(n\) equal length intervals and using left endpoints.

7. (3 points/part.) Suppose that \(f\) is an integrable function defined on \([0, 3]\), with

\[
\int_{0}^{1} f(x) \, dx = 7, \quad \int_{1}^{2} f(x) \, dx = 5, \quad \text{and} \quad \int_{2}^{3} f(x) \, dx = 32.
\]

Find

\[
\int_{0}^{3} f(x) \, dx \quad \text{and} \quad \int_{2}^{3} 2f(x) \, dx.
\]