

Note: you will need the results from A3 to complete this assignment.

1. Using mathematical induction, prove your solution to

$$\sum_{i=1}^n i^3 = an^4 + bn^3 + cn^2 + dn + e.$$

2. Carefully sketch the graph of  $y = x^3$  from  $x = 0$  to  $x = 2$  and show a sequence of  $n$  circumscribing rectangles starting and  $x = 0$  to  $x = 2$  whose heights are determined by the right-side of the rectangle meeting the curve and whose base has width  $\frac{2}{n}$ .
3. Derive an algebraic expression for the sum of the areas of the  $n$  rectangles you sketched.
4. Simplify the expression and collapse the open form sum to a rational function of  $n$  using the polynomial formula from assignment A3 or problem 1 above.
5. Take the limit of this rational function as  $n \rightarrow \infty$ .