MTH 385 2022-04-04 Worksheet

Exercise 1. *When was calculus developed? And who where the main developers?*

Exercise 2. *Which developer used the* binomial theorem *as his starting point? And, how is his approach reflected today?*

Exercise 3. *Which developer used the* infinitesimals *as his starting point? And, how is his approach reflected today?*

Exercise 4 (8.2.1)**.** *Find* $1+2+\cdots+n$ *by summing the identity* $(m+1)^2-m^2=2m+1$ *from* $m=1$ *to n. Similarly find* $1^2+2^2+\cdots+n^2$ *using the identity*

$$(m+1)^3-m^3=3m^2+3m+1$$

together with the previous result. Likewise, find $1^3+2^3+\cdots+n^3$ *using the identity*

$$(m+1)^4-m^4=4m^3+6m^2+4m+1$$

and so on.

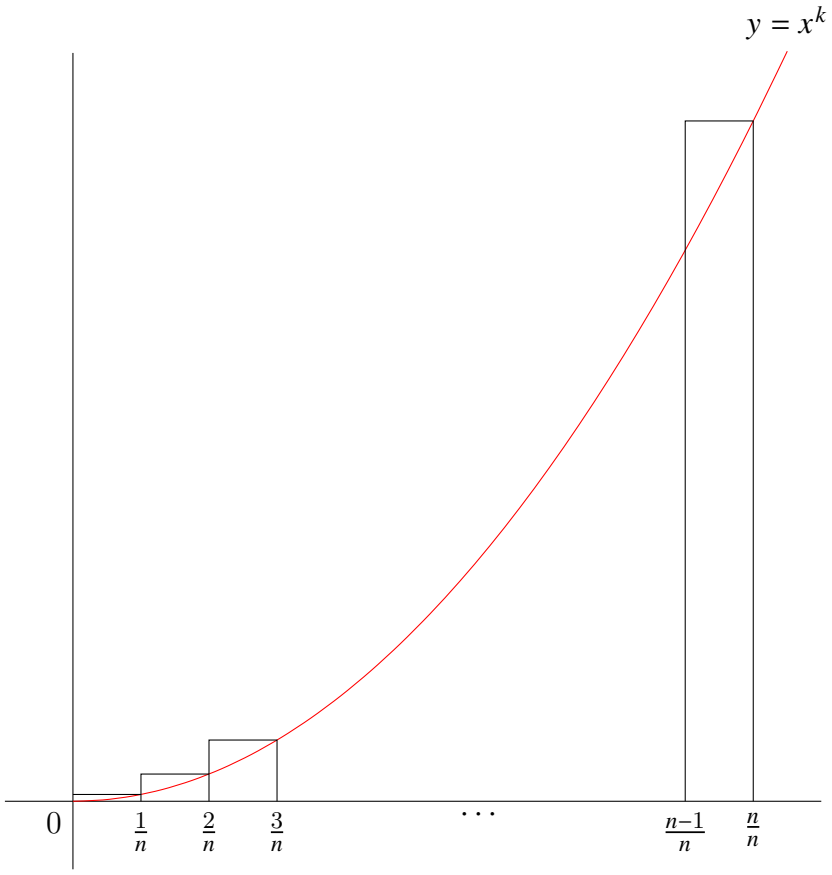

Figure 8.1: Approximating an area by rectangles

Exercise 5 (8.2.2)**.** *Show that the approximation to the area under* $y=x^2$ *by rectangles in Figure 8.1 has value* $(2n+1)n(n+1)/6n^3$*, and deduce that the area under the curve is* $1/3$*.*