

**MATHEMATICS 121, Problem Set I**  
**Due Tuesday, January 14**

1) Write each of the following sums in expanded form.

a)  $\sum_{i=1}^6 \frac{1}{i+1}$

b)  $\sum_{i=4}^6 3^i$

2) Write each of the following sums in sigma notation.

a)  $\sqrt{3} + \sqrt{4} + \sqrt{5} + \sqrt{6} + \sqrt{7}$

b)  $\frac{3}{7} + \frac{4}{8} + \frac{5}{9} + \frac{6}{10} + \cdots + \frac{23}{27}$

3) Evaluate

a)  $1 + 2x + 3x^2 + 4x^3 + \cdots + 100x^{99}$

b)  $\sum_{j=1}^n \frac{j}{2^j}$

*Hint:* Use  $\sum_{i=0}^n x^i = \frac{1-x^{n+1}}{1-x}$

4) Let  $f(x) = 16 - x^2$ .

a) Let  $P$  be the partition  $\{0, 1, 2, 3, 4\}$  of the interval  $[0, 4]$ . Find the approximation to the area under the graph of  $f(x)$  from  $x = 0$  to  $x = 4$  determined by the partition  $P$  and sample points  $x_i^*$  =right endpoint.

b) Sketch the graph of  $f$  and the approximating rectangles.

5) Let  $A_n$  be the area of a polygon with  $n$  equal sides inscribed in a circle with radius  $r$ . Find  $A_n$  and  $\lim_{n \rightarrow \infty} A_n$ .

6) The graph of a function  $f(x)$  is given below. Estimate  $\int_0^8 f(x) dx$  using four equal subintervals with (a) right endpoints, (b) left endpoints and (c) midpoints.



