

Honors Math 181 Homework 5 Version A

1. Solve the following inequalities.

(i) $x^2 > x$

(ii) $\sqrt{x+3} \leq 2$

(iii) $|2x+7| > |x-3|$

2. Use induction to verify that

$$\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \cdots + \frac{1}{\sqrt{n}} \leq 2\sqrt{n}$$

holds for every natural number n .

3. Simplify the following sums.

(i) $\sum_{k=n}^{2n+1} k^2$

(ii) $\sum_{k=1}^n (k+17)^3$

4. Suppose $\lim_{x \rightarrow 3} f(x) = 4$. Use the δ - ϵ definition of limit to verify $\lim_{x \rightarrow 3} \sqrt{f(x)} = 2$.

5. Use the limit laws to find the following limits.

(i) $\lim_{x \rightarrow 3} (x^3 - 6)$

(ii) $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1}$

(iii) $\lim_{x \rightarrow 0} \frac{x^{-1} + 1}{x^{-2} + 2}$

(iv) $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x}{x}$

(v) $\lim_{x \rightarrow 0} \frac{\sin 7x}{x}$