Honors Math 181 Homework 1 Version A

1. Convert the following repeating decimals into fractions.
   - **(i)** $2.5\overline{6}$
   - **(ii)** $0.18\overline{36}$
2. Let p be an integer. If p^2 is divisible by 3, show that p must be divisible by 3.
3. Show that $\sqrt{3}$ is irrational.
4. Determine the intervals in which the following inequalities are satisfied.
   - **(i)** $(x-2)(x+4)(x-4) > 0$
   - **(ii)** $x^2 - 3x + 2 < 0$
   - **(iii)** $\left|x + \dfrac{1}{x}\right| \geq 6.$
5. Show that $x + \dfrac{1}{x} \geq 2$ for every $x > 0$.
6. Simplify the following sums:
   - **(i)** $\displaystyle\sum_{k=6}^{n} k = 6 + 7 + 8 + 9 + \cdots + n$
   - **(ii)** $\displaystyle\sum_{k=3}^{14} x^k = x^3 + x^4 + \cdots + x^{14}$
7. Use the δ-ϵ definition of continuity to show
   - **(i)** $f(x) = 6x$ is continuous at $x_0 = -1$
   - **(ii)** $g(x) = x^2$ is continuous at $x_0 = 1$
   - **(iii)** $h(x) = 3/x$ is continuous at $x_0 = 5$.