

Math 181 Quiz 5 Version A

1. Solve the inequality $|2x - 7| < 1$.

2. Solve the limits

(i) $\lim_{n \rightarrow \infty} \frac{n + 5}{7 - 2n}$

(ii) $\lim_{n \rightarrow \infty} (\sqrt{n^2 + n} - \sqrt{n^2 - 3n})$

3. Find a formula for $\sum_{k=n}^{2n} (k + 1)$

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4. Define

$$e = \lim_{n \rightarrow \infty} S_n \quad \text{where} \quad S_n = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \cdots + \frac{1}{n!}.$$

In class we showed e was irrational. Provide a proof for one of the following steps:

Step 1. $S_m \leq e \leq S_m + \frac{1}{m} \frac{1}{m!}$ for every positive m .

Step 2. No fraction $\frac{p}{q}$ could satisfy $S_m \leq \frac{p}{q} \leq S_m + \frac{1}{m} \frac{1}{m!}$ for every positive m .