Worksheet 3

1. Complete the following definitions.
   (a) We say for two sets A and B that $|A| = |B| \dots$
   (b) We say a sequence $x_n \to x \dots$
   (c) We say a sequence $x_n \to \infty \dots$

2. True or False.
   (a) $|\mathbb{Q}| = |\mathbb{R}|$
   (b) $|\mathbb{N}| = |\mathbb{Q}|$
   (c) For any set A we have $|A| \neq |P(A)|$ where $P(A)$ is the power set of A.
   (d) $|x - y| \geq ||x| - |y||$
   (e) $|x - y| \geq |x| + |y|$

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3. Show that the even numbers have the same cardinality as the odd numbers.

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4. Show that $\{\frac{1}{n^2+1}\}_{n=1}^{\infty}$ converges by monotone sequence theorem.

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5. Show that the sequence $\{\frac{n^2+1}{n}\}_{n=1}^{\infty}$ diverges to infinity.