Some properties a sequence $\{x_n\}_{n=1}^{\infty}$ might have

- increasing: $\forall n \ (x_n \leq x_{n+1})$
- decreasing: $\forall n \ (x_{n+1} \leq x_n)$
- monotonic (or monotone): either increasing or decreasing
- bounded: $\exists B \, \forall n \ (|x_n| \leq B)$
- convergent to limit L: $\forall \varepsilon > 0 \, \exists M_\varepsilon \, \forall n \geq M_\varepsilon \ (|x_n - L| < \varepsilon)$
  Verbal shorthand: "for every neighborhood of L, the sequence is eventually in the neighborhood."
- Cauchy: $\forall \varepsilon > 0 \, \exists M \, \forall n \geq M \, \forall m \geq M \ (|x_n - x_m| < \varepsilon)$

Which properties do these sequences satisfy?

(a) $x_n = 1/n$
(b) $x_n = \cos(\pi n)$
(c) $x_n = 2^n$
(d) $x_n = 2^{1/n}$
(e) $x_n = \cos(n)$

Are these sequences increasing? decreasing? monotonic? bounded? convergent? Cauchy?

Assignment due next class

- Write solutions to Exercises 2.1.14 and 2.1.19 (both easy).
- Read subsection 2.2.1 in the textbook (about limits and inequalities).