exercise 1:
Let q be in $(0,1)$. Show that the sequence $a_n = n^2 q^n$ is eventually decreasing.

exercise 2:
Let $a_1 = \frac{3}{2}$, $a_{n+1} = \dfrac{a_n}{2} + \dfrac{1}{a_n}$.
(i). Show by induction that $\sqrt{2} \leq a_n \leq \frac{3}{2}$, for all $n \geq 1$. **Hint**: First verify that the function $f : [\sqrt{2}, \frac{3}{2}] \to \mathbb{R}$, $f(x) = \frac{x}{2} + \frac{1}{x}$ is increasing.
(ii). Show by induction that a_n is decreasing.

exercise 3:
Show from the definition of divergence to infinity that the sequence $a_n = n^2$ satisfies $\lim a_n = \infty$.

exercise 4:
If a_n is a sequence such that $\lim a_n = \infty$ and b_n is bounded, show that $\lim a_n + b_n = \infty$.

exercise 5:
True or false: if c_n converges to zero and $c_n \neq 0$ for all n then $\frac{1}{c_n}$ diverges to infinity or minus infinity.

exercise 6:
Textbook problem. A.1.1: o, p. For o, first show that na_n is eventually decreasing.

exercise 7:
B.1.9.

exercise 8:
B.1.10.

exercise 9:
Find $\displaystyle\lim_{x\to\infty} \frac{x^2 + x^2\cos x}{x^3 + x\sin x}$.

exercise 10:
Show that $x \cos x$ has no limit as $x \to \infty$.