2. (a) $X := (n), Y := (-n)$ or $X := ((-1)^n), Y := ((-1)^{n+1})$. Many other examples are possible. 
(b) $X = Y := ((-1)^n)$.

5. (a) $(2^n)$ is not bounded since $2^n > n$ by Exercise 1.2.13.
   (b) The sequence is not bounded.

8. In (3) the exponent $k$ is fixed, but in $(1 + 1/n)^n$ the exponent varies.

11. \[\frac{a(a/b)^n + b}{(a/b)^n + 1}\] has limit \[\frac{0 + b}{0 + 1} = b\] since \(0 < a/b < 1\).

16. (a) $(1/n)$,  
   (b) $(n)$.

17. If $1 < r < L$, let $\varepsilon := L - r$. Then there exists $K$ such that $|x_{n+1}/x_n - L|$ for $n > K$. From this one gets $x_{n+1}/x_n > r$ for $n > K$. If $n > K$, then $x_n \geq r^{n-K}x_K$. Since $r > 1$, it follows that $(x_n)$ is not bounded.

22. It follows from Exercise 2.2.16 that $u_n = \frac{1}{2}(x_n + y_n + |x_n - y_n|)$. Theorems 3.2.3 and 3.2.9 imply that $\lim(u_n) = \frac{1}{2}[\lim(x_n) + \lim(y_n) + |\lim(x_n) - \lim(y_n)|] = \max\{\lim(x_n), \lim(y_n)\}$. Similarly for $\lim(v_n)$. 