Practice problems, convergence or divergence of sequences.

Determine whether the sequence converges or diverges. If it converges, find the limit.

1) $a_n = \dfrac{n^2 - 1}{n^2 + 1}$

2) $\{\arctan 2n\}$

3) $a_n = \cos\left(\dfrac{np}{2}\right)$

4) $\left\{\dfrac{p^n}{3^n}\right\}$

5) $\left\{\dfrac{\ln(n^2)}{n}\right\}$

6) $a_n = n2^{-n}$

7) $a_n = \dfrac{n^3}{n!}$

8) $a_n = \dfrac{\cos^2 n}{2^n}$

9) $a_n = (-1)^n \dfrac{n+1}{n}$

Determine whether the sequence is increasing, decreasing, or not monotonic.

10) $a_n = \dfrac{n-2}{n+2}$

11) $a_n = \dfrac{\sqrt{n+1}}{5n+3}$