

Solutions to the even problems 2-8 in 10.2:

2) This is oscillating back and forth, so we will need to use  $(-1)^n$ , which goes -1, 1, -1, 1...

This is oscillating the wrong way, so if we add a negative sign,  $-(-1)^n$ , we get 1, -1, 1, -1, 1...

Now we add one to shift everything up:  $a_n = 1 - (-1)^n$  and we get 2, 0, 2, 0 as desired.

4) The denominators are powers of 2:  $2^n$ . The numerators are one less than the denominators:  $2^n - 1$ . So  $a_n = (2^n - 1)/2^n$ .

6) The numerators are just  $n$ ; the denominators are the squares, but they are shifted up by 1, so we need  $(n + 1)^2$ . There is an extra negative sign out front, so we need a  $(-1)^n$ . Thus  $a_n = (-1)^n(n/(n + 1)^2)$ .

8) Rewrite this sequence in terms of powers:  $1^{-2}, 2^1, 3^{-2}, 4^1, 5^{-2}, 6^1, \dots$  If we can model the sequence -2, 1, -2, 1, -2, 1, we can put that in the exponent. The sequence  $(-1)^n$  only oscillates by 2: -1, 1, -1, 1..., but  $2(-1)^n$  oscillates by 4: -2, 2, -2, 2... That means we need one halfway in-between:  $(3/2)(-1)^n = -3/2, 3/2, -3/2, 3/2...$  Now we just have to shift every term down a bit:  $(3/2)(-1)^n - 1/2 = -2, 1, -2, 1$  which is the sequence we want. Now we just put that in the exponent:  $a_n = n^{(3/2)(-1)^n - 1/2}$ .