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: $1^{-2}, 2^1, 3^{-2}, 4^1, 5^{-2}, 6^1, ...$ 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: $(3/2)(-1)^n - 1/2 = -2, 1, -2, 1$ whichis the sequence we want. Now we just put that in the exponent: $a_n = n^{(3/2)(-1)^n - 1/2}$.