Worksheet to Practice Classifying Recurrence Relations

For each recurrence relation, tell if it

is linear,
is homogeneous, and/or
has constant coefficients.

To tell if a non-homogeneous recurrence relation is linear or has constant coefficients, ignore the non-homogeneous part.

1.

$$t_n = 3nt_{n-1}$$

- Homogeneous.
- Linear.
- Does not have constant coefficients, as the coefficient is 3*n.*

2.

$$u_n = 37u_{n-1} - 15u_{n-2} - 17u_{n-3}$$

- Homogeneous.
- Linear.
- Has constant coefficients.

3.

$$v_n = 6v_{n-1} + 7n$$

- Not homogeneous.
- Linear, as we ignore the 7*n* part because it is not homogeneous.
- Has constant coefficients, , as we continue to ignore the 7*n* part.

4.

$$w_n = 2w_n + 2n^2$$

- Not homogeneous.
- Linear.
- Has constant coefficients.

5.

$$z_n = -w_{n-1} + 4w_{n-4}$$

- Homogeneous.
- Linear.
- Has constant coefficients.