Summary of Quadratic Sequences

- Common difference occurs at D2
- The relation will be parabolic with graphed
- The equation has the form $t_n = an^2 + bn + c$
- The graph of the data is discrete

Section 1.5: Cubic Sequences

A Cubic Sequence
- Common Difference occurs at D3
- Its equation has the form $tn = an^3 + bn^2 + cn + d$

Example: Determine if each sequence is arithmetic, quadratic, cubic, or neither. Then find the equation of each sequence. Finally, find t_8.

A) {22, 15, 10, 7, 6, 7, . . . }

D_1: −7, −5, −3, −1, 1

D_2: 2, 2, 2, 2

Quadratic

$y = ax^2 + bx + c$ $a = 1$, $b = -10$, $c = 31$

$t_n = 1n^2 - 10n + 31$

$t_8 = 1(8)^2 - 10(8) + 31$

$t_8 = 64 - 80 + 31$

$t_8 = 15$

B) {-4, 3, 22, 59, 120, 211, . . .}

D_1: 7, 19, 37, 61, 91

D_2: 12, 18, 24, 30

D_3: 6, 6, 6 ⟶ Cubic

$y = ax^3 + bx^2 + cx + d$

$t_n = 1n^3 + 0n^2 + 0n - 5$

$a = 1$, $b = 0$, $c = 2.5E{-}11{=}0$, $d = -5$

$t_n = n^3 - 5$

$t_8 = (8)^3 - 5$

$t_8 = 512 - 5$

$t_8 = 507$

C) {1, 2, 4, 8, 16, 32, 64, . . .}

Do on your own.

Example: Generate the first 4 terms of each cubic sequence.

A) $t_n = -3n^3 + 2n^2$

$t_1 = -3(1)^3 + 2(1)^2$

$t_1 = -3(1) + 2(1)$

$t_1 = -3 + 2$

$t_1 = -1$

$t_2 = -3(2)^3 + 2(2)^2$

$t_2 = -3(8) + 2(4)$

$t_2 = -24 + 8$

$t_2 = -16$

$t_3 = -3(3)^3 + 2(3)^2$

$t_3 = -3(27) + 2(9)$

$t_3 = -81 + 18$

$t_3 = -63$

$t_4 = -3(4)^3 + 2(4)^2$

$t_4 = -3(64) + 2(16)$

$t_4 = -192 + 32$

$t_4 = -160$

$\{-1, -16, -63, -160, \ldots\}$

B) $t_n = 4n^3 + n^2 - 3n - 6$