Warm Up

$$t_n = t_1 + (n-1)d$$

2. For what value of m will $m - 2$, $2m - 6$, and $4m - 8$ be consecutive terms of an arihmetic sequence?

5, 7, 9

10, 15, 20

$$(2m-6) - (m-2) = (4m-8) - (2m-6)$$
$$2m - 6 - m + 2 = 4m - 8 - 2m + 6$$
$$m - 4 = 2m - 2$$
$$-m = 2$$
$$\boxed{m = -2} \longrightarrow -4, -10, -16$$

3. Which term of the arithmetic progression $-3, 4, 11, \ldots$ is 116?

$$t_n = t_1 + (n-1)d$$
$$116 = -3 + (n-1)7$$
$$116 = -3 + 7n - 7$$
$$\frac{126}{7} = \frac{7n}{7}$$
$$\boxed{18 = n}$$

$\boxed{18^{th}}$

4. How many multiples of 7 are there between 29 and 361?

$$35, 42, 49, \ldots 357$$
$$357 = 35 + (n-1)(7)$$
$$357 = 35 + 7n - 7$$
$$\frac{329}{7} = \frac{7n}{7}$$
$$\boxed{47 = n} \quad \text{"47 multiples of 7"}$$

Levels of Differences

ex: -25, -20, -15, -10, -5, ...

The results of subtracting consecutive terms in a sequence are referred to as **Levels of Difference**.

ex: 2, 9, 22, 41, 66, ...

$t_{25} = ?$

- If the **First-level Differences (D_1)** result in a common number, the relation is LINEAR

```
QuadReg
 y=ax²+bx+c
 a=3
 b=-2
 c=1
 R²=1
```

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

...ifferences (D_2) result in a common number, the relation is QUADRATIC

ex: -4, 7, 40, 107, 220, ...

$t_{20} = ?$

```
L1    L2    L3    2
1     -4    ------
2     7
3     40
4     107
5     220
------
L2(6) =
```

```
EDIT CALC TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg
```

CubicReg Y₁

- ...ences (... ...um   ...C

```
CubicReg
 y=ax³+bx²+cx+d
 a=2
 b=-1
 c=-2.1E-11  ⟶ -2.1 × 10⁻¹¹
 d=-5
 R²=1
```

```
 X    Y₁
20    15595

X=
```
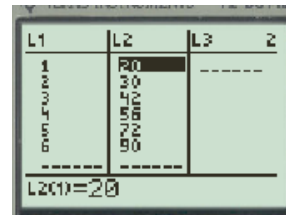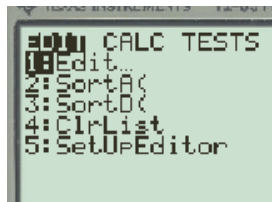
$$t_n = 2n^3 - n^2 + 0n - 5$$

- If the **Forth-Level Differences (D_4)** result in a common number, the relation is QUARTIC

ex: 1, 16, 81, 256, 625, 1296, ...

Creating Equations with the TI-83

1. Determine if the sequence is linear, quadratic, cubic or quartic.
   (Using Levels of Difference-on your own paper)

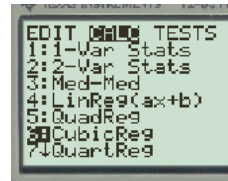2. Enter the data into Lists: $n \Rightarrow L_1$ $t_n \Rightarrow L_2$
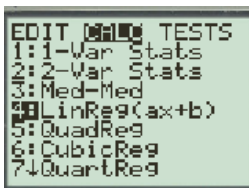
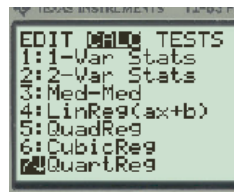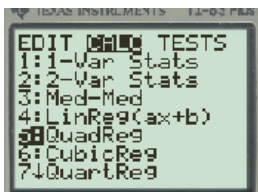3. Then "Calculate" the regression for the type of function determined by the level of diffences.

| Linear | $y = ax + b$ |

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

| Quadratic | $y = ax^2 + bx + c$ |

| Quartic | $y = ax^4 + bx^3 + cx^2 + dx + e$ |

HOMEWORK…

Worksheet - Levels of Differences.doc

Worksheet Solns - Levels of Differences.doc

Attachments

Worksheet - Plotting Polar Coordinates.doc