Here’s a guide to explaining some common DAX time intelligence functions to students. I’ll include definitions, syntax, and examples for each function. This will provide a comprehensive overview of how these functions are used in DAX for time-based calculations.

### 1. \*\*TOTALYTD\*\*

\*\*Definition\*\*: Calculates the year-to-date total of a given expression.

\*\*Syntax\*\*:

```DAX

TOTALYTD(<expression>, <dates>[, <filter>])

```

\*\*Example\*\*:

To calculate the year-to-date sales:

```DAX

YearToDateSales = TOTALYTD(SUM(Sales[SalesAmount]), Sales[SalesDate])

```

\*\*Explanation\*\*:

- \*\*`<expression>`\*\*: The measure or calculation (e.g., `SUM(Sales[SalesAmount])`).

- \*\*`<dates>`\*\*: The column containing dates (e.g., `Sales[SalesDate]`).

- \*\*`<filter>`\*\*: Optional. Additional filter conditions.

\*\*Output\*\*:

If you have sales data from January 1st to July 31st, `TOTALYTD` will sum up the sales from January 1st to the current date in the year.

### 2. \*\*TOTALQTD\*\*

\*\*Definition\*\*: Calculates the quarter-to-date total of a given expression.

\*\*Syntax\*\*:

```DAX

TOTALQTD(<expression>, <dates>[, <filter>])

```

\*\*Example\*\*:

To calculate the quarter-to-date sales:

```DAX

QuarterToDateSales = TOTALQTD(SUM(Sales[SalesAmount]), Sales[SalesDate])

```

\*\*Explanation\*\*:

- \*\*`<expression>`\*\*: The measure or calculation (e.g., `SUM(Sales[SalesAmount])`).

- \*\*`<dates>`\*\*: The column containing dates (e.g., `Sales[SalesDate]`).

- \*\*`<filter>`\*\*: Optional. Additional filter conditions.

\*\*Output\*\*:

If the current date is in Q2 of the year, `TOTALQTD` will sum up sales from the beginning of Q2 to the current date.

### 3. \*\*TOTALMTD\*\*

\*\*Definition\*\*: Calculates the month-to-date total of a given expression.

\*\*Syntax\*\*:

```DAX

TOTALMTD(<expression>, <dates>[, <filter>])

```

\*\*Example\*\*:

To calculate the month-to-date sales:

```DAX

MonthToDateSales = TOTALMTD(SUM(Sales[SalesAmount]), Sales[SalesDate])

```

\*\*Explanation\*\*:

- \*\*`<expression>`\*\*: The measure or calculation (e.g., `SUM(Sales[SalesAmount])`).

- \*\*`<dates>`\*\*: The column containing dates (e.g., `Sales[SalesDate]`).

- \*\*`<filter>`\*\*: Optional. Additional filter conditions.

\*\*Output\*\*:

If the current date is July 15th, `TOTALMTD` will sum up sales from July 1st to July 15th.

### 4. \*\*DATEADD\*\*

\*\*Definition\*\*: Shifts dates by a specified number of intervals (days, months, years) in the past or future.

\*\*Syntax\*\*:

```DAX

DATEADD(<dates>, <number\_of\_intervals>, <interval>)

```

\*\*Example\*\*:

To get sales from the same day last year:

```DAX

SalesLastYear = CALCULATE(SUM(Sales[SalesAmount]), DATEADD(Sales[SalesDate], -1, YEAR))

```

\*\*Explanation\*\*:

- \*\*`<dates>`\*\*: The column containing dates (e.g., `Sales[SalesDate]`).

- \*\*`<number\_of\_intervals>`\*\*: Number of intervals to shift (e.g., `-1` for last year).

- \*\*`<interval>`\*\*: Type of interval (e.g., `YEAR`, `MONTH`, `DAY`).

\*\*Output\*\*:

If today is July 15, 2024, `DATEADD` with `-1, YEAR` will return July 15, 2023.

### 5. \*\*DATESYTD\*\*

\*\*Definition\*\*: Returns a table with dates from the beginning of the year to the current date in the context.

\*\*Syntax\*\*:

```DAX

DATESYTD(<dates>[, <year\_end\_date>])

```

\*\*Example\*\*:

To get dates for the year-to-date period:

```DAX

DatesYTD = DATESYTD(Sales[SalesDate])

```

\*\*Explanation\*\*:

- \*\*`<dates>`\*\*: The column containing dates (e.g., `Sales[SalesDate]`).

- \*\*`<year\_end\_date>`\*\*: Optional. Defines the fiscal year end date.

\*\*Output\*\*:

If today is July 15, 2024, `DATESYTD` will include all dates from January 1, 2024, to July 15, 2024.

### 6. \*\*DATESMTD\*\*

\*\*Definition\*\*: Returns a table with dates from the start of the month to the current date in the context.

\*\*Syntax\*\*:

```DAX

DATESMTD(<dates>)

```

\*\*Example\*\*:

To get dates for the month-to-date period:

```DAX

DatesMTD = DATESMTD(Sales[SalesDate])

```

\*\*Explanation\*\*:

- \*\*`<dates>`\*\*: The column containing dates (e.g., `Sales[SalesDate]`).

\*\*Output\*\*:

If today is July 15, 2024, `DATESMTD` will include all dates from July 1, 2024, to July 15, 2024.

### 7. \*\*DATESQTD\*\*

\*\*Definition\*\*: Returns a table with dates from the start of the quarter to the current date in the context.

\*\*Syntax\*\*:

```DAX

DATESQTD(<dates>)

```

\*\*Example\*\*:

To get dates for the quarter-to-date period:

```DAX

DatesQTD = DATESQTD(Sales[SalesDate])

```

\*\*Explanation\*\*:

- \*\*`<dates>`\*\*: The column containing dates (e.g., `Sales[SalesDate]`).

\*\*Output\*\*:

If today is July 15, 2024, and Q3 starts on July 1, 2024, `DATESQTD` will include all dates from July 1, 2024, to July 15, 2024.

### Summary for Students

1. \*\*TOTALYTD\*\*: Calculates the total from the start of the year to today.

2. \*\*TOTALQTD\*\*: Calculates the total from the start of the quarter to today.

3. \*\*TOTALMTD\*\*: Calculates the total from the start of the month to today.

4. \*\*DATEADD\*\*: Shifts dates by a specified number of periods (e.g., last year, next month).

5. \*\*DATESYTD\*\*: Returns all dates from the start of the year to today.

6. \*\*DATESMTD\*\*: Returns all dates from the start of the month to today.

7. \*\*DATESQTD\*\*: Returns all dates from the start of the quarter to today.

Using clear examples and visuals will help students understand how these functions operate in practical scenarios.