

# How to Write Custom Metrics

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### I. [Introduction](#)

The Custom Metric facility allows you to create new metrics from existing Stock Rover metrics. The metric can then be used as filters in screeners as custom equation screeners or they can be added to Table Views as individual columns.

The capabilities of custom metrics range from creating a simple ratio of two existing metrics, to comparing the same metric over different time periods, to creating a brand-new formula with whatever level of complexity is needed to achieve the desired result.

This guide will explain custom metric writing in the following five sections: Functions, Examples, Historical Time Periods, Tips and Troubleshooting.

## II. Functions

Functions can be used when creating custom metrics or creating equation screeners. Below is a list of the available functions along with their descriptions.

**\*\*Note: The functions are case sensitive and must be written in lower case**

<b>abs</b>	Returns the absolute value of value
<b>and</b>	Boolean function combines tests and checks for both tests to be true
<b>case when then else end</b>	This function lets you evaluate conditions and return a value when the first condition is met (like an IF-THEN-ELSE statement)
<b>exp</b>	Return e raised to the power of number
<b>greatest</b>	Selects the greatest of a set of values
<b>ifnull</b>	Returns the second value if first value is null. Selects the least of a set of values
<b>least</b>	Selects the least of a set of values
<b>null</b>	A special term for values that unavailable or not applicable. Metrics will commonly evaluate as null when trying to compute a growth rate of negative values or when comparing historical values that go further back than the stock's history.
<b>nullif</b>	Returns null if the first and second are equal otherwise it returns the first value.
<b>or</b>	Boolean function combines tests and checks for either test to be true
<b>pow</b>	Returns the value raised to the nth power

### III. Examples

Listed below are a practical example for each function. It will indicate if the example is a Custom Metric example or an Equation Screener example.

#### Abs

**Description:** *This custom metric shows one-year return as a percent of the Max Drawdown over 5 years*

**Formula:**

$100 * \text{"1-Year Return [Now]"} / \text{abs( "Max Drawdown 5-Year" )}$

**Add Custom Metric**

Name:  Description:

Display Format:

**Formula**

Test

100 \* "1-Year Return [Now]" / abs( "Max Drawdown 5-Year" )

**Sample Values for AAPL (Apple)**

Metric	Value	Period	Units
1-Year Return	81.75	Now	Percentage
Max Drawdown 5-Year	-38.52	Now	Number

**Includable Metrics**

Quick Add (Search)

- Balance Sheet
- Cash Flow Statement
- Custom Metrics
- Fair Value and DCF Model
- Grades and Scores
- Growth
- Income Statement
- Industry Deciles
- Per Share
- Price
- Profile
- Profitability
- Profitability vs. Industry
- Profitability vs. Sector
- Returns
  - 1-Day Return
  - 5-Day Return
  - 10-Day Return
  - 1-Month Return
  - 3-Month Return
  - 6-Month Return
  - YTD Return
  - 1-Year Return
  - 2-Year Return
  - 3-Year Return
  - 5-Year Return
  - 10-Year Return

and

**Description:** *This equation example shows one-year return as a percent of the Max Drawdown over 5 years*

**Formula:**

"Altman Z-Score [Now] " > 1 and "Altman Z-Score [Now] " > "Altman Z-Score [TTM1]"

**Add Criteria**

Equation

Test Help Auto Search:

"Altman Z-Score [Now] " > 1 and "Altman Z-Score [Now] " > "Altman Z-Score [TTM1]"

3066 out of 14967 stocks from North American Exchanges (20.5%) pass

Sample Values for AAPL (Apple)

Change ticker...

Metric	Value	Period	Units
Altman Z-Score	5.26	Now	Ratio
Altman Z-Score [TTM1]	5.26	TTM 1 Year Ago	Ratio

**Metrics and Functions**

Quick Add (Search)

- Equation Functions
- Analyst Estimates
- Analyst Ratings
- Balance Sheet
- Cash Flow Statement
- Custom Metrics
- Fair Value and DCF Model
- Grades and Scores
- Growth
- Income Statement
- Industry Deciles
- Per Share
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- Profile
- Profitability
- Profitability vs. Industry
- Profitability vs. Sector
- Returns
- Returns vs. Industry
- Returns vs. S&P 500
- Returns vs. Sector
- Sector Deciles
- Stock Rover Ratings
- Technical Indicators
- Valuation
- Valuation Range
- Valuation Yields
- Volume

OK Cancel

## case when then else end

**Description:** *This custom metric shows Net Cash as % of share price and excludes negative values*

### Formula:

100 \* case when "Net Cash Per Share [Now]" < 0 then null else "Net Cash Per Share [Now]" / "Price [Now]" end

**Add Custom Metric**

Name:  Description:

Display Format:

**Formula**

Test     Auto Search

100 \* case when "Net Cash Per Share [Now]" < 0 then null else "Net Cash Per Share [Now]" / "Price [Now]" end

Valid. For ticker AAPL metric is '-'

**Sample Values for AAPL (Apple)**

Metric	Value	Period	Units
Net Cash Per Share	-3.76	Now	Dollars
Price	320.27	Now	Dollars

**Includable Metrics**

Quick Add (Search)

- Equation Functions
- Analyst Estimates
- Analyst Ratings
- Balance Sheet
- Cash Flow Statement
- Custom Metrics
- Fair Value and DCF Model
- Grades and Scores
- Growth
- Income Statement
- Industry Deciles
- Per Share
- Price
- Profile
- Profitability
- Profitability vs. Industry
- Profitability vs. Sector
- Returns
- Returns vs. Industry
- Returns vs. S&P 500
- Returns vs. Sector
- Sector Deciles
- Stock Rover Ratings
- Technical Indicators
- Valuation
- Valuation Range
- Valuation Yields

# greatest

**Description:** *This custom metric shows the best yearly return vs. the market in the past 3 years*

## Formula:

greatest ( "1-Year Return vs S&P 500 [Y1]" , "1-Year Return vs S&P 500 [Y2]" , "1-Year Return vs S&P 500 [Y3]" )

**Add Custom Metric**

Name:  Description:

Display Format:

**Formula**

Test

greatest ( "1-Year Return vs S&P 500 [Y1]" , "1-Year Return vs S&P 500 [Y2]" , "1-Year Return vs S&P 500 [Y3]" )

Valid. For ticker AAPL metric is '57.6'

**Sample Values for AAPL (Apple)**

Metric	Value	Period	Units
1-Year Return vs S&P 500 [Y1]	57.63	1 Calendar Year Ago	Percentage
1-Year Return vs S&P 500 [Y2]	-0.94	2 Calendar Years Ago	Percentage
1-Year Return vs S&P 500 [Y3]	26.12	3 Calendar Years Ago	Percentage

**Includable Metrics**

Quick Add (Search)

- Equation Functions
- Analyst Estimates
- Analyst Ratings
- Balance Sheet
- Cash Flow Statement
- Custom Metrics
- Fair Value and DCF Model
- Grades and Scores
- Growth
- Income Statement
- Industry Deciles
- Per Share
- Price
- Profile
- Profitability
- Profitability vs. Industry
- Profitability vs. Sector
- Returns
- Returns vs. Industry
- Returns vs. S&P 500
- Returns vs. Sector
- Sector Deciles
- Stock Rover Ratings
- Technical Indicators
- Valuation
- Valuation Range
- Valuation Yields

## is null AND is not null

**Description:** *This equation example finds stocks that recently stopped paying dividends entirely*

**Formula:**

"Dividend Per Share [Now]" is null and "Dividend Per Share [TTM1]" is not null

The screenshot shows the 'Add Criteria' dialog box. The main area contains the equation: "Dividend Per Share [Now]" is null and "Dividend Per Share [TTM1]" is not null. Below the equation, it states: "1620 out of 14967 stocks from North American Exchanges (10.8%) pass".

Sample Values for AAPL (Apple)

Metric	Value	Period	Units
Dividend Per Share	3.28	Now	Dollars
Dividend Per Share [TTM1]	3.08	TTM 1 Year Ago	Dollars

Metrics and Functions

- Equation Functions
- Analyst Estimates
- Analyst Ratings
- Balance Sheet
- Cash Flow Statement
- Custom Metrics
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- Grades and Scores
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- Income Statement
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- Returns vs. Industry
- Returns vs. S&P 500
- Returns vs. Sector
- Sector Deciles
- Stock Rover Ratings
- Technical Indicators
- Valuation
- Valuation Range
- Valuation Yields
- Volume

OK Cancel

# least

**Description:** *This equation example finds stocks that underperformed the market by at least 35% during a recent calendar year*

## Formula:

least ( "1-Year Return vs S&P 500 [Y1]" , "1-Year Return vs S&P 500 [Y2]" ,  
"1-Year Return vs S&P 500 [Y3]" ) < 35

**Add Criteria**

Equation

Test    Auto Search:

least ( "1-Year Return vs S&P 500 [Y1]" , "1-Year Return vs S&P 500 [Y2]" , "1-Year Return vs S&P 500 [Y3]" ) < 35

9702 out of 14967 stocks from North American Exchanges (64.8%) pass

Sample Values for AAPL (Apple)

Change ticker...

Metric	Value	Period	Units
1-Year Return vs S&P 500 [Y1]	57.63	1 Calendar Year Ago	Percentage
1-Year Return vs S&P 500 [Y2]	-0.94	2 Calendar Years Ago	Percentage
1-Year Return vs S&P 500 [Y3]	26.12	3 Calendar Years Ago	Percentage

**Metrics and Functions**

Quick Add (Search)

- Equation Functions
- Analyst Estimates
- Analyst Ratings
- Balance Sheet
- Cash Flow Statement
- Custom Metrics
- Fair Value and DCF Model
- Grades and Scores
- Growth
- Income Statement
- Industry Deciles
- Per Share
  - Basic EPS Plus Discontinued Operations
  - Cash Per Share
  - Cash Flow Per Share
  - Consecutive Dividend Growth Years ★
  - Debt Per Share
  - Diluted EPS Plus Discontinued Operations
  - Dividend Per Share
  - EPS
  - EPS Diluted
  - Equity Per Share
  - FFO per Share
  - Free Cash Flow Per Share
  - Last Quarter Actual EPS
  - Last Quarter Expected EPS
  - Net Cash Per Share
  - Next Dividend Payment Per Share
  - Operating Income Per Share
  - Sales Per Share
  - Tangible Equity Per Share
  - Total Asset Per Share



# nullif

**Description:** This equation uses nullif within a custom metric that computes an effective interest rate on the company's debt, where the nullif ensures we are looking only at companies with debt

**Formula:**

$$100 * \text{Interest Expense [Now]} / \text{nullif}(\text{"Total Debt [Now]"}, 0)$$

**Add Custom Metric**

Name:  Description:

Display Format:

**Formula**

Test

100 \*\* Interest Expense [Now]' / nullif('Total Debt [Now]', 0)

Valid. For ticker AAPL metric is '2.9'

**Sample Values for AAPL (Apple)**

Metric	Value	Period	Units
Interest Expense	3217.32	Now	Millions of Dollars
Total Debt	109507	Now	Millions of Dollars

**Includable Metrics**

Quick Add (Search)

- Equation Functions
- Analyst Estimates
- Analyst Ratings
- Balance Sheet
- Cash Flow Statement
- Custom Metrics
- Fair Value and DCF Model
- Grades and Scores
- Growth
- Income Statement
  - Cost of Sales
  - Depreciation and Amortization
  - Diluted Shares
  - EBIT
  - EBITDA
  - Income After Tax
  - Income Before Tax
  - Interest Expense
  - Net Income
  - Net Income Common Stockholders
  - Net Income From Continuing And Discontinued Operat...
  - Operating Income
  - Other Income and Expenses
  - Research and Development
  - Sales
  - Sales Per Employee
  - Selling General and Administrative

**OR**

**Description:** *This equation finds stocks with extremely low valuation ratios based on either Price to Earnings or Price to Book*

**Formula:**

("Price / Earnings [Now]" < 4 and "Price / Earnings [Now]" > 0) or ("Price / Book [Now]" < .5 and "Price / Book [Now]" > 0)

**Add Criteria**

Equation

Test Price / Earnings [Now] Help Auto Search:

("Price / Earnings [Now]" < 4 and "Price / Earnings [Now]" > 0) or ("Price / Book [Now]" < .5 and "Price / Book [Now]" > 0)

Sample Values for AAPL (Apple)

Change ticker...

Metric	Value	Period	Units
Price / Earnings	25.07	Now	Ratio
Price / Book	17.71	Now	Ratio

Metrics and Functions

Quick Add (Search)

- Technical Indicators
- Valuation
  - Buyback Yield ★
  - Capital Expenditure to EBITDA ★
  - Cash Return
  - Chowder Rule 1-Year Percent ★
  - Chowder Rule 3-Year Percent ★
  - Chowder Rule 5-Year Percent ★
  - Dividend Yield
  - Earnings Power Value ★
  - EBITDA / Enterprise Value
  - EV / EBITDA
  - EV / EBIT ★
  - EV / FCF ★
  - EV / Sales ★
  - EV to EBIT
  - EV to FCF
  - EV to Forward EBIT
  - EV to Forward EBITDA
  - EV to Forward Sales
  - EV to Pre-Tax Income
  - EV to Sales
  - EV to Total Assets
  - Forward P/E
  - Greenblatt Earnings Yield ★
  - Margin of Safety (EPV) ★
  - P/E Differential ★
  - PEG Forward
  - PEG Trailing
  - Price / Book
  - Price / Cash Flow
  - Price / Earnings

OK Cancel

# pow

**Description:** *This custom metric computes a 5-year growth rate of Sales Per Employee*

## Formula:

$100 * (\text{pow}(\text{case when "Sales Per Employee [Now]" / "Sales Per Employee [TTM5]" < 0}$   
then null else "Sales Per Employee [Now]" / "Sales Per Employee [TTM5]" end , 1/5 ) - 1)

The screenshot shows the 'Add Custom Metric' dialog box with the following details:

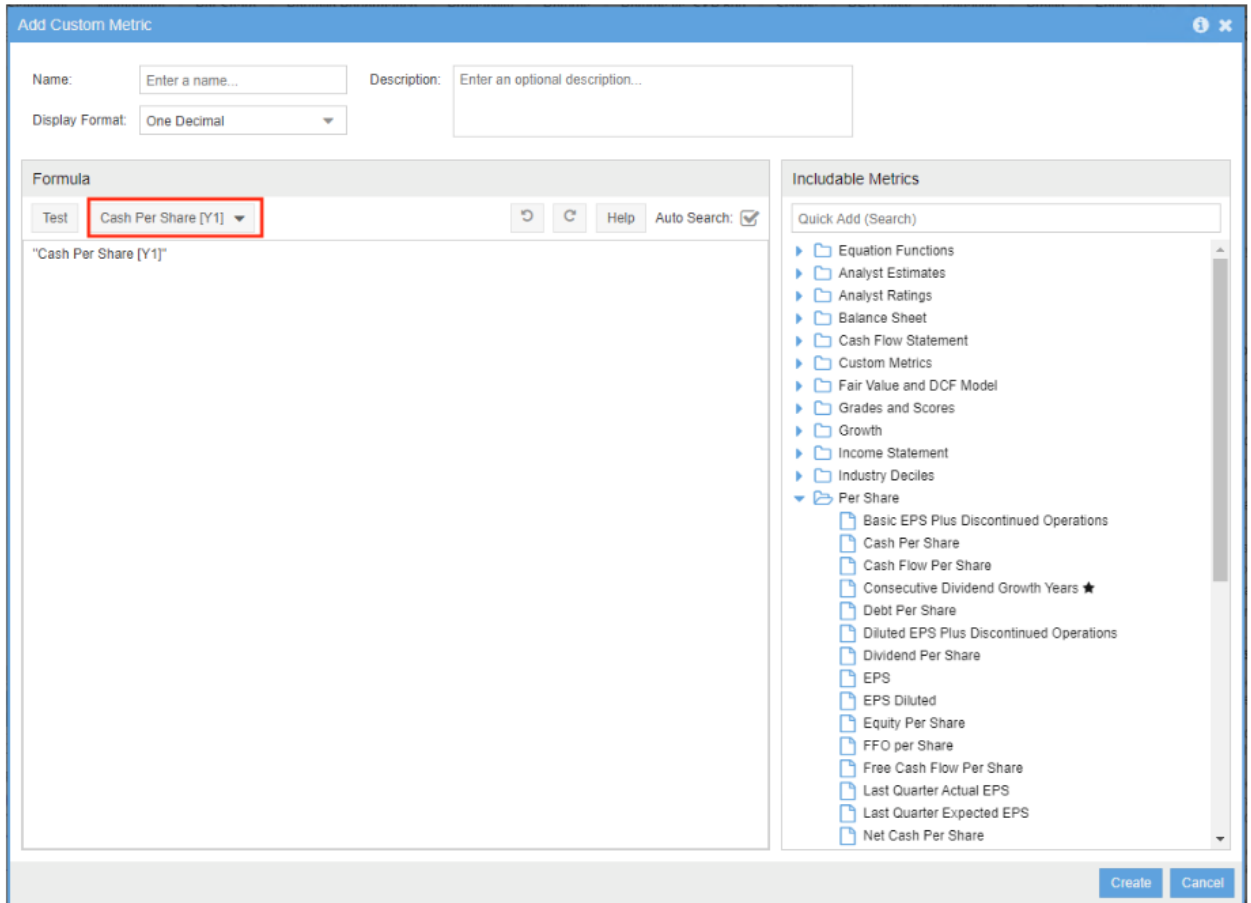
- Name:** Enter a name...
- Description:** Enter an optional description...
- Display Format:** One Decimal
- Formula:**  $100 * (\text{pow}(\text{case when "Sales Per Employee [Now]" / "Sales Per Employee [TTM5]" < 0}$  then null else "Sales Per Employee [Now]" / "Sales Per Employee [TTM5]" end , 1/5 ) - 1)
- Includable Metrics:** A list of metrics including Equation Functions, Analyst Estimates, Analyst Ratings, Balance Sheet, Cash Flow Statement, Custom Metrics, Fair Value and DCF Model, Grades and Scores, Growth, Income Statement (with sub-items like Cost of Sales, Depreciation and Amortization, etc.), and Selling General and Administrative.
- Sample Values for AAPL (Apple):** A table showing values for 'Sales Per Employee' and 'Sales Per Employee [TTM5]'.

Metric	Value	Period	Units
Sales Per Employee	1971880.88	Now	Dollars
Sales Per Employee [TTM5]	2129170	TTM 5 Years Ago	Dollars

## IV. Historical Time Periods

In both Custom Metrics and Equations screeners you can access historical data for the metrics that support historical data.

In the screenshot below you can see the highlighted box on how to access the historical time periods.



Below is a screenshot of the window that appears when you click on the box highlighted from the above screenshot.

Select Time Period for Cash Per Share

Type:  Quarters  Trailing Twelve Months (TTM)  Calendar Years

Value:  Most Recent TTM  TTM 1 Year Ago  TTM 2 Years Ago  TTM 3 Years Ago  TTM 4 Years Ago  TTM 5 Years Ago  TTM 6 Years Ago  TTM 7 Years Ago  TTM 8 Years Ago  TTM 9 Years Ago  TTM 10 Years Ago

**Metric Description:** Cash per share is the sum of cash and short-term investments divided by the total number of shares.  
Units: Dollars

**Explanation:** Selects the value that would show in the main table. For Income and Cash Flow metrics this is typically a trailing 12 month value while for Balance Sheet metrics such as Cash per Share it would be the most recent quarterly value.

OK Cancel

Here is what each time period represents:

- a. **Now:** The value that would show in the main table, this is normally the trailing 12-month value
- b. **Most Recent Quarter (MRQ):** Uses the most recent quarterly result
- c. **TTM X Years Ago:** Uses the trailing twelve months of data, but for prior years rather than the current trailing twelve months
- d. **X Calendar Years Ago:** Looks at results for individual calendar years
- e. **X Quarters Ago:** Looks back X quarters

For example, EPS is shown in the main table as a trailing 12 month value so "EPS [Now]" is equal to "EPS [MRQ]" + "EPS [Q1]" + "EPS [Q2]" + "EPS [Q3]"

## V. Tips

**Tip:** Make sure to always test the metric or equation to see if the formula is valid

**Add Custom Metric**

Name:  Description:

Display Format:

**Formula**

Sales Per Employee [TTM5]    Auto Search:

100 \* (pow( case when "Sales Per Employee [Now]" / "Sales Per Employee [TTM5]" < 0 then null else "Sales Per Employee [Now]" / "Sales Per Employee [TTM5]" end , 1/5 ) -1)

**Sample Values for AAPL (Apple)**

Metric	Value	Period	Units
Sales Per Employee	1971880.88	Now	Dollars
Sales Per Employee [TTM5]	2129170	TTM 5 Years Ago	Dollars

**Includable Metrics**

Quick Add (Search)

- Equation Functions
- Analyst Estimates
- Analyst Ratings
- Balance Sheet
- Cash Flow Statement
- Custom Metrics
- Fair Value and DCF Model
- Grades and Scores
- Growth
- Income Statement
  - Cost of Sales
  - Depreciation and Amortization
  - Diluted Shares
  - EBIT
  - EBITDA
  - Income After Tax
  - Income Before Tax
  - Interest Expense
  - Net Income
  - Net Income Common Stockholders
  - Net Income From Continuing And Discontinued Oper...
  - Operating Income
  - Other Income and Expenses
  - Research and Development
  - Sales
  - Sales Per Employee
  - Selling General and Administrative

**Tip:** *It is very important to use parentheses in the equations or custom metrics to make sure the order of operations is done correctly*

**Example:**

"FFO per Share [Now]" \* "Diluted Shares [Now]" / "Equity [Now]" + "Accumulated Depreciation [Now]"

*Returns -284.2 for a particular ticker, but if you add parentheses...*

("FFO per Share [Now]" \* "Diluted Shares [Now]") / ("Equity [Now]" + "Accumulated Depreciation [Now]")

*Returns 0.5 for the same ticker*

**Add Custom Metric**

Name:  Description:

Display Format:

**Formula**

Test

"FFO per Share [Now]" \* "Diluted Shares [Now]" / "Equity [Now]" + "Accumulated Depreciation [Now]"

Valid. For ticker CSH.UN.TO metric is '-284.2'

Sample Values for CSH.UN.TO (Chartwell Retirement)

Metric	Value	Period	Units
FFO per Share	0.79	Now	Dollars
Diluted Shares	213.65	Now	Number
Equity	591.78	Now	Millions of Dollars
Accumulated Depreciation	-284.46	Now	Millions of Dollars

**Includable Metrics**

Quick Add (Search)

- Equation Functions
- Analyst Estimates
- Analyst Ratings
- Balance Sheet
  - Accumulated Depreciation
  - Cash
  - Cash Ratio ★
  - Cash & Short-term %
  - Cash as a % of Market Cap ★
  - Cash to Total Assets ★
  - Current Assets
  - Current Liabilities
  - Current Ratio
  - Days Inventory
  - Days Sales Outstanding
  - Debt / Assets ★
  - Debt / Equity
  - Debt / Net Current Assets ★
  - Equity
  - Gross PP&E
  - Intangibles
  - Intangibles %
  - Interest Coverage
  - Inventory
  - Inventory %
  - Long Term Debt
  - Long Term Debt / Total Capital

Add Custom Metric

Name:  Description:

Display Format:

Formula

Test     Auto Search:

```

= ("FFO per Share [Now]" * "Diluted Shares [Now]") / ("Equity [Now]" + "Accumulated Depreciation [Now]")
    
```

Valid. For ticker CSH.UN.TO metric is '0.5'

Sample Values for CSH.UN.TO (Chartwell Retirement)

Metric	Value	Period	Units
FFO per Share	0.79	Now	Dollars
Diluted Shares	213.65	Now	Number
Equity	591.78	Now	Millions of Dollars
Accumulated Depreciation	-284.46	Now	Millions of Dollars

Includable Metrics

- Quick Add (Search)
- ▶ Equation Functions
  - ▶ Analyst Estimates
  - ▶ Analyst Ratings
  - ▼ Balance Sheet
    - ▶ Accumulated Depreciation
    - ▶ Cash
    - ▶ Cash Ratio ★
    - ▶ Cash & Short-term %
    - ▶ Cash as a % of Market Cap ★
    - ▶ Cash to Total Assets ★
    - ▶ Current Assets
    - ▶ Current Liabilities
    - ▶ Current Ratio
    - ▶ Days Inventory
    - ▶ Days Sales Outstanding
    - ▶ Debt / Assets ★
    - ▶ Debt / Equity
    - ▶ Debt / Net Current Assets ★
    - ▶ Equity
    - ▶ Gross PP&E
    - ▶ Intangibles
    - ▶ Intangibles %
    - ▶ Interest Coverage
    - ▶ Inventory
    - ▶ Inventory %
    - ▶ Long Term Debt
    - ▶ Long Term Debt / Total Capital



## VI. Troubleshooting

- a. If you copy a formula from a document or email to the formula window and then the test fails, make sure to retype the quotes. Sometimes the quotes get copied in the wrong format.
- b. If you are using the **pow** function for a custom metric and you add it to a view, and then you start getting an error *Server not responding*, then you need to edit the function and add the case statement because the pow function only accepts positive numbers.

The **pow** function should have the **case** when statement around it like this:

```
100 * pow(case when ("EPS [Now]" - "EPS [Y5]") / "EPS [Y5]" <= 0 then null else ("EPS [Now]" - "EPS [Y5]") / "EPS [Y5]" end, 1/5) - 1
```

- c. If you test a custom metric that is looking at historical values and the data doesn't return, this could be because of the following:
  - i. The ticker is a foreign company, they don't typically have quarterly data
  - ii. Companies with a Market Cap of less than \$10 million won't have quarterly data