Investment Banking

Here are some frequently used Excel formulae in the Investment Banking sector:

Financial Modeling Formulae

1. XNPV: Calculates the present value of a series of cash flows.

- Syntax: =XNPV(rate, dates, cash flows)

2. XIRR: Calculates the internal rate of return of a series of cash flows.

- Syntax: =XIRR(cash flows, dates)

3. PV: Calculates the present value of a future cash flow.

- Syntax: =PV(rate, nper, pmt)

4. FV: Calculates the future value of a present cash flow.

- Syntax: =FV(rate, nper, pmt)

5. NPV: Calculates the net present value of a series of cash flows.

- Syntax: =NPV(rate, cash flows)

Valuation Formulae

1. DCF: Calculates the present value of a series of cash flows using a discount rate.

- Syntax: =PV(rate, nper, pmt)

2. WACC: Calculates the weighted average cost of capital.

- Syntax: =(cost of debt * (1 - tax rate) * debt / (debt + equity)) + (cost of equity * equity / (debt + equity))

3. EV/EBITDA: Calculates the enterprise value to EBITDA ratio.

- Syntax: =EV / EBITDA

Other Formulae

1. IF: Tests a condition and returns one value if true and another value if false.

- Syntax: =IF(logical test, [value if true], [value if false])

2. MAX/MIN: Returns the maximum or minimum value in a range of cells.

- Syntax: =MAX(range) or =MIN(range)

3. STDEV: Calculates the standard deviation of a range of cells.

- Syntax: =STDEV(range)

Data Retrieval Formulae

1. VLOOKUP: Looks up a value in a table and returns a corresponding value.
   - Syntax: =VLOOKUP(lookup value, table array, col index num, [range lookup])
2. INDEX/MATCH: Looks up a value in a table and returns a corresponding value.
   - Syntax: =INDEX(range, MATCH(lookup value, range, 0))
3. HLOOKUP: Looks up a value in a table and returns a corresponding value from a row.
   - Syntax: =HLOOKUP(lookup value, table array, row index num, [range lookup])
4. LOOKUP: Looks up a value in a table and returns a corresponding value.
   - Syntax: =LOOKUP(lookup value, table array)

Data Aggregation Formulae

1. SUMIFS: Sums a range of cells based on multiple criteria.
   - Syntax: =SUMIFS(sum range, criteria range1, criteria1, [criteria range2], [criteria2], ...)
2. AVERAGEIFS: Averages a range of cells based on multiple criteria.
   - Syntax: =AVERAGEIFS(average range, criteria range1, criteria1, [criteria range2], [criteria2], ...)
3. COUNTIFS: Counts the number of cells in a range that meet multiple criteria.
   - Syntax: =COUNTIFS(criteria range1, criteria1, [criteria range2], [criteria2], ...)

Data Filtering Formulae

1. FILTER: Filters a range of cells based on a specified criteria.
   - Syntax: =FILTER(range, criteria)
2. DATABASE: Returns a range of cells from a database that meet specified criteria.
   - Syntax: =DATABASE(database, field, criteria)

Data Validation Formulae

1. IFERROR: Returns a value if an error occurs.
   - Syntax: =IFERROR(cell, value)
2. IFBLANK: Returns a value if a cell is blank.
   - Syntax: =IFBLANK(cell, value)

Basic Counting Formulae

1. COUNT: Counts the number of cells in a range that contain numbers.

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- Syntax: =COUNT(range)

2. COUNTA: Counts the number of cells in a range that contain any type of data.

- Syntax: =COUNTA(range)

3. COUNTBLANK: Counts the number of blank cells in a range.

- Syntax: =COUNTBLANK(range)

Conditional Counting Formulae

1. COUNTIF: Counts the number of cells in a range that meet a specified condition.

- Syntax: =COUNTIF(range, criteria)

2. COUNTIFS: Counts the number of cells in a range that meet multiple specified conditions.

- Syntax: =COUNTIFS(range1, criteria1, [range2], [criteria2], ...)

3. COUNTIF with multiple criteria: Counts the number of cells in a range that meet multiple specified conditions using the COUNTIF function with multiple criteria.

- Syntax: =COUNTIF(range, criteria1) + COUNTIF(range, criteria2)

Counting Formulae with Wildcards

1. COUNTIF with wildcard: Counts the number of cells in a range that contain a specified text string using a wildcard.

- Syntax: =COUNTIF(range, "*text*")

2. COUNTIFS with wildcard: Counts the number of cells in a range that meet multiple specified conditions using a wildcard.

- Syntax: =COUNTIFS(range1, "*text1*", range2, "*text2*")

Other Counting Formulae

1. DCOUNT: Counts the number of cells in a range that meet a specified condition using a criteria range.

- Syntax: =DCOUNT(range, field, criteria)

2. DCOUNTA: Counts the number of cells in a range that contain any type of data using a criteria range.

- Syntax: =DCOUNTA(range, field, criteria)

Basic SWITCH Formulae

1. SWITCH: Switches between different values based on a condition.

- Syntax: =SWITCH(expression, value1, result1, [value2, result2], ...)

2. SWITCH with default value: Switches between different values based on a condition and returns a default value if no match is found.

- Syntax: =SWITCH(expression, value1, result1, [value2, result2], ..., default_value)

SWITCH Formulae with Multiple Conditions

1. SWITCH with multiple conditions: Switches between different values based on multiple conditions.

- Syntax: =SWITCH(expression, value1, result1, value2, result2, ..., valueN, resultN)

2. SWITCH with multiple conditions and default value: Switches between different values based on multiple conditions and returns a default value if no match is found.

- Syntax: =SWITCH(expression, value1, result1, value2, result2, ..., valueN, resultN, default_value)

SWITCH Formulae with Text Values

1. SWITCH with text values: Switches between different text values based on a condition.

- Syntax: =SWITCH(expression, "text1", result1, "text2", result2, ...)

2. SWITCH with text values and default value: Switches between different text values based on a condition and returns a default value if no match is found.

- Syntax: =SWITCH(expression, "text1", result1, "text2", result2, ..., default_value)

Examples of SWITCH Formulae

1. Grade calculation: =SWITCH(score, "A", 90-100, "B", 80-89, "C", 70-79, "D", 60-69, "F", 0-59)

2. Status update: =SWITCH(status, "active", "Active", "inactive", "Inactive", "pending", "Pending")

3. Category assignment: =SWITCH(category, "electronics", "Electronics", "clothing", "Clothing", "home goods", "Home Goods")

Here are some frequently used formulae for portfolio management with examples:

Return Calculation Formulae

1. Holding Period Return (HPR):

- Syntax: = (Ending Value - Beginning Value) / Beginning Value

- Example: If you invested $1,000 in a stock and sold it for $1,200 after one year, the HPR would be (1,200 - 1,000) / 1,000 = 20%.

2. Total Return:

- Syntax: = (Dividend + Interest + Capital Gains) / Beginning Value

- Example: If you invested $1,000 in a mutual fund that paid a dividend of $50, interest of $20, and had a capital gain of $150, the total return would be (50 + 20 + 150) / 1,000 = 22%.

3. Annualized Return:

- Syntax: = (Ending Value / Beginning Value) ^ (1 / Number of Years) - 1

- Example: If you invested $1,000 in a stock and it grew to $1,500 after 3 years, the annualized return would be (1,500 / 1,000) ^ (1 / 3) - 1 = 14.47%.

Risk Calculation Formulae

1. Standard Deviation:

- Syntax: =STDEV(range)

- Example: If you have a portfolio with returns of 5%, 7%, 3%, 9%, and 1%, the standard deviation would be STDEV(0.05, 0.07, 0.03, 0.09, 0.01) = 0.028.

2. Beta:

- Syntax: =COVAR(range1, range2) / VAR(range2)

- Example: If you have a portfolio with returns of 5%, 7%, 3%, 9%, and 1%, and the market returns are 4%, 6%, 2%, 8%, and 0%, the beta would be COVAR(0.05, 0.04) / VAR(0.04) = 1.25.

3. Value-at-Risk (VaR):

- Syntax: =NORMSINV(probability) * Standard Deviation * Square Root of Time

- Example: If you have a portfolio with a standard deviation of 0.028 and you want to calculate the VaR for a 95% confidence level over a 1-day period, the VaR would be NORMSINV(0.95) * 0.028 * SQRT(1) = 0.045.

Portfolio Optimization Formulae

1. Markowitz Model:

- Syntax: =MINIMIZE(Variance) SUBJECT TO: Expected Return >= Target Return

- Example: If you have a portfolio with expected returns of 8%, 10%, and 12%, and variances of 0.01, 0.02, and 0.03, respectively, and you want to optimize the portfolio to achieve a target return of 10%, the Markowitz model would provide the optimal weights for each asset.

2. Sharpe Ratio:

- Syntax: =(Expected Return - Risk-Free Rate) / Standard Deviation

- Example: If you have a portfolio with an expected return of 10%, a risk-free rate of 2%, and a standard deviation of 0.15, the Sharpe ratio would be (0.10 - 0.02) / 0.15 = 0.53.

3. Treynor Ratio:

- Syntax: =(Expected Return - Risk-Free Rate) / Beta

- Example: If you have a portfolio with an expected return of 10%, a risk-free rate of 2%, and a beta of 1.25, the Treynor ratio would be (0.10 - 0.02) / 1.25 = 0.064.

Performance Evaluation Formulae

1. Information Ratio:

- Syntax: =(Expected Return - Benchmark Return) / Tracking Error

- Example: If you have a portfolio with an expected return of 10%, a benchmark return of 8%, and a tracking error of 2%, the information ratio would be (0.10 - 0.08) / 0.02 = 1.

2. Sortino Ratio:

- Syntax: =(Expected Return - Risk-Free Rate) / Downside Deviation

- Example: If you have a portfolio with an expected return of 10%, a risk-free rate of 2%, and a downside deviation of 0.10, the Sortino ratio would be `(0.

Here are some frequently used formulae for predictive modeling with examples:

Linear Regression Formulae

1. Simple Linear Regression:

- Syntax: y = β0 + β1*x + ε

- Example: Predicting house prices based on number of bedrooms.

- y = house price
- x = number of bedrooms
- β0 = intercept
- β1 = slope
- ε = error term

2. Multiple Linear Regression:

- Syntax: y = β0 + β1*x1 + β2*x2 + … + βn*xn + ε

- Example: Predicting house prices based on number of bedrooms, square footage, and location.

- y = house price
- x1 = number of bedrooms
- x2 = square footage
- x3 = location
- β0 = intercept
- β1, β2, β3 = slopes
- ε = error term

Logistic Regression Formulae

Formulae

1. Logistic Regression:

- Syntax: p = 1 / (1 + e^(-z))

- Example: Predicting probability of default based on credit score.

- p = probability of default
- z = credit score
- e = base of natural logarithm

2. Odds Ratio:

- Syntax: OR = e^β

- Example: Calculating odds ratio for probability of default based on credit score.

- OR = odds ratio
- β = coefficient

Decision Tree Formulae

1. Gini Impurity:

- Syntax: Gini = 1 - ∑(p^2)

- Example: Calculating Gini impurity for a node in a decision tree.

- Gini = Gini impurity
- p = probability of each class

2. Information Gain:

- Syntax: IG = H(parent) - ∑(p * H(child))

- Example: Calculating information gain for a split in a decision tree.

- IG = information gain
- H(parent) = entropy of parent node
- p = probability of each child node
- H(child) = entropy of each child node

Clustering Formulae

1. K-Means Clustering:

- Syntax: d = ∑(x - μ)^2

- Example: Calculating distance between a data point and a cluster centroid.

- d = distance
- x = data point

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- μ = cluster centroid

2. Hierarchical Clustering:

- Syntax: d = linkage(distance matrix)

- Example: Calculating linkage between clusters.

- d = linkage
- distance matrix = matrix of distances between data points

Neural Network Formulae

1. Activation Function:

- Syntax: a = sigmoid(z) = 1 / (1 + e^(-z))

- Example: Calculating output of a sigmoid activation function.

- a = output
- z = input
- e = base of natural logarithm

2. Backpropagation:

- Syntax: δ = (y - a) * a * (1 - a)

- Example: Calculating error gradient for a neuron.

- δ = error gradient
- y = target output
- a = actual output

These formulae are frequently used in predictive modelling to build and train machine learning models.