Handbook for Formulas

List of formulas for
Level 1
CFA® Program

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	TIME VALUE OF MONEY
1	Nominal interest rate = real risk-free rate + expected inflation rate
2	Required interest rate on security = nominal risk-free rate + default risk premium + liquidity premium + maturity risk premium
3	Effective Annual Return (EAR) = EAR = $(1 + \text{periodic rate})^m - 1$ Periodic rate = stated annual rate/m M = number of compounding periods per year
4	$FV = PV(1 + I/Y)^N$ $PV = \frac{FV}{\left(1 + \frac{I}{Y}\right)^N}$ FV = future value PV = Present value I/Y = Rate of return per compounding period N = Number of compounding periods
5	PV perpetuity $= \frac{PMT}{(I/Y)}$ PMT = Fixed periodic cash flow
	DISCOUNTED CASH FLOW APPLICATION
6	$NPV = \sum \frac{CF}{(1+r)^t}$ CF = Expected cash flow r = Discount rate
7	IRR $0 = CF + \frac{CF1}{(1+IRR)} + \frac{CF2}{(1+IRR)^2} + \frac{CF3}{(1+IRR)^3}$ IRR = Internal rate of return.
8	$HPR = \frac{(\text{Ending Value} - \text{Beginning Value})}{(\text{Beginning Value})}$ HPR = Holding period return
9	RBD = D/F*360/t RBD = Annualised yield on a bank discount basis D = Dollar discount = purchase price - face value F = Face value t = Number of days until maturity 360 = Bank convention of number of days in a year
10	Effective Annual Yield (EAY) = $(1 + HPY)^{365/t} - 1$ HPY = Holding period yield

11	RMM= 360/days*HPY RMM=Money market yield
12	Bond equivalent yield= $\{(1+\text{effective annual yield})^{1/2}-1\} * 2$
13	Geometric Mean= $[(1+R1)(1+R2)\ldots.(1+Rn)]^{1/n}-1$ Geometric mean return is also known as compound annual rate of return
14	Harmonic Mean= $\frac{N}{\sum(1/x)}$
15	Position of observation at a given percentile Ly=(n+1) $\frac{y}{100}$
16	Range= Maximum Value- Minimum Value
17	Mean Absolute Deviation (MAD)= $\frac{(\sum Xi-X)}{n}$ X=Arithmetic mean
18	Population Variance $\sigma^2 = \frac{(\Sigma(Xi-\mu)^2)}{N}$
19	Standard Deviation σ = square root of variance
20	Sample Variance $\sigma^2 = \frac{(\Sigma(Xi-\mu)^2)}{N-1}$
21	Chebyshev's Inequality Percentage of observations that lie within k standard deviations of the mean is at least= $1-1/k^2$
22	Coefficient of Variation CV= $\frac{\text{(standard deviation of x)}}{\text{(average value of x)}}$
23	Sharpe Ratio= $\frac{(Rp-RFR)}{\sigma p}$ Rp= Portfolio Return RFR= Risk Free Rate σp= standard deviation of portfolio return
24	Sample Skewness (Sk) = $\frac{(\sum(Xi-x)^3)}{s^3}$ s =sample standard deviation
25	Sample Skewness (Sk) = $\frac{(\sum(Xi-x)^4)}{s^4}$
26	Excess Kurtosis= Sample Kurtosis - 3

	PROBABILITY CONCEPTS
27	Multiplication Rule Of Probability, P(AB)=P(A/B)*P(B)
28	Addition Rule Of Probability, P(A or B)= P(A)+P(B)-P(AB)
29	Total Probability Rule (Used to determine unconditional probability of an event) P(A)=P(A/B1)P(B1)+P(A/B2)P(B2)+……+P(A/BN)P(BN)
30	Expected value of random variable= weighted average of possible outcomes, Weights = probabilities that the outcome will occur
31	Covariance Cov(Ri, Rj)= E{[Ri-E(Ri)][(Rj-E(Rj)]} Cov(Ri, Rj)= Corr(Ri, Rj) σ(Ri)σ(Rj)
32	Correlation Cofficient $Corr(Ri,Rj) = \frac{(Cov(Ri,Rj))}{(\sigma(Ri)\sigma(Rj))}$
33	Weight of asset in portfolio, w= market value of investment in asset i/market value of the portfolio
34	Portfolio Expected Value E(Rp)=w1E(R1) + w2E(R2)+…… wnE(Rn)
35	Variance of 2 Asset Portfolio
36	Variance of 3 asset Portfolio
37	Bayes Formula, Updated Probability=(Probability of new information for a given event / unconditional probability of new event)*(prior probability of event)
38	Factorial n! = n*(n-1)*(n-2)*(n-3)…… *1 0!=1
39	Labelling, n! / (n1!)*(n2!)*…. (nn!)
40	Combination, n Cr=n! /(n-r)!r!
41	Permutation, n! /(n-r)!
	COMMON PROBABILITY DISTRIBUTIONS
42	To standardize a normal variable, $z = \frac{(Observation - Population\ Mean)}{(Standard\ Deviation)}$

43	Roy's safety first criteria, $SFR = \frac{([E(Rp)-Rl])}{(\sigma p)}$ **Choose the portfolio with largest SFR
44	Continuously compounded rate of return, Rcc=ln(1+HPR)
	SAMPLING AND ESTIMATION
45	Standard Error of sample Mean, $\sigma x = \sigma/\sqrt{n}$ σ= Standard deviation of population n=Size of the sample
46	t-distribution to construct a confidence interval, When variance is unknown, $x = t_{\alpha/2} * s/\sqrt{n}$ When variance is known, $x = t_{\alpha/2} * \sigma/\sqrt{n}$ x= Point estimate of population mean $t_{\alpha/2}$=The t-reliability factor $s/\sqrt{n}$=Standard error of sample mean
	SAMPLING AND ESTIMATION
47	$\text{Test Statistic} = \frac{(\text{Sample Mean - Hypothesized Mean})}{(\text{Standard Error of Sample Mean})}$
48	t-statistic When population variance is unknown, $Tn\text{-}1 = \frac{(x-\mu)}{(s/\sqrt{n})}$ When population variance is known, $Tn\text{-}1 = \frac{(x-\mu)}{(\sigma/\sqrt{n})}$
49	Chi-square test: $X2 = \frac{(n-1)s2}{\sigma 2}$
50	F-distribution test, F=s12/s22
	TECHNICAL ANALYSIS
51	Arms Index or Short Term Trading Index, $TRIN = \frac{(\text{Number of advancing Issues / Number of declining issues})}{(\text{Volume of advancing issues / Volume of declining issues})}$

	DEMAND AND SUPPLY ANALYSIS: INTRODUCTION
52	Demand function for good X, Qdx=f(Px,I,Py,….) Px=Price of good X, I=Some measure of average income per year, Py=Prices of related goods
53	Price Elasticity of Demand= %ΔQuantity Demanded/ %ΔPrice Δ=change
54	Cross Price Elasticity= %ΔQuantity Demanded/%ΔPrice Of Related Goods Δ=change
55	Income Elasticity=%ΔQuantity Demanded/%Δ in Income Δ=change
	DEMAND AND SUPPLY ANALYSIS: THE FIRM
56	Accounting profit=total revenue-total accounting costs
57	Economic profit=accounting profit-implicit opportunity costs Or Economic profit=total revenue-total economic costs
58	Normal profit, Economic profit=accounting profit-normal profit=0 Normal profit is the accounting profit that makes economic profit equal to zero
59	Marginal Cost, MC=change in total cost/change in output
	AGGREGATE OUTPUT, PRICES AND ECONOMIC GROWTH
60	Nominal GDP=$\sum$Pi,tQi,t Pi,t= Price of good i in year t. Qi,t=Quantity of good I produced in year t
61	GDP deflator= (nominal GDP/value of year t output at year t)*100
62	Per Capita Real GDP= GDP/population
63	GDP by expenditure approach, GDP= C+I+G+(X-M) C=Consumption spending, I=Business investment, G=Government purchases, X=Exports, M=Imports
64	GDP by Income Approach, GDP=national income+ capital consumption allowance+ statistical discrepancy
65	National Income= compensation of employees (wages and benefits) + corporate and government enterprise profits before taxes +Interest Income +Unincorporated business net income (business owner's income) +rent +indirect business taxes-subsidies

66	Personal Income= national Income +transfer payments to households -indirect business taxes -corporate income taxes -undistributed corporate profits
67	Personal disposable income=personal income-personal taxes
68	Quantity Theory Of Money, MV=PY M=Money Supply, V=Velocity of money in transactions, P=Price level Y=Real GDP
69	Recessionary Gap or Output Gap=Real GDP-Full Employment GDP
70	Potential GDP=aggregate hours worked*labour productivity In terms of economic growth, Growth in potential GDP=growth in labour force+ growth in labour productivity
71	Production Function, Y=A*f(L,K) Y=Aggregate economic output, L=Size of labour force, K=Amount of capital available, A=Total factor productivity
	UNDERSTANDING BUSINESS CYCLES
72	CPI= (Cost of basket at current prices/cost of basket at base period prices)*100
73	Total amount of money that can be created, Money created= new deposit/reserve requirement
74	Money Multiplier=1/Reserve Requirement
75	Fisher Effect, Rnom=Rreal+E(I)+RP Rnom=Nominal interest rate, Rreal=Real Interest rate RP=Risk premium for uncertainty
76	Neutral Interest Rate= Real trend rate of economic growth + inflation target
77	Fiscal Multiplier= 1/[1-MPC(1-t)]
78	Relation between trade deficit, saving and domestic investment, Exports-imports= private savings+ government savings+ domestic investment
	CURRENCY EXCHANGE RATES
79	Real Exchange Rate= Nominal Exchange Rate(d/f)* $\frac{\text{(CPI foreign)}}{\text{(CPI domestic)}}$

80	Interest Rate Parity, $\frac{\text{foward}}{\text{spot}} = \frac{(1+\text{interest rate (domestic)}}{(1+\text{interest rate (foreign)}}$
	FINANCIAL STATEMENT ANALYSIS: AN INTRODUCTION
81	Accounting Equation, (Balance Sheet) Assets= liabilities + equity Assets=liabilities+ contributed capital+ ending retained earnings Assets=liabilities+ contributed capital+ beginning retained earnings+ revenue-expenses-dividends
82	Income statement equation, Net income=revenues-expenses
83	Straight line depreciation expense= $\frac{(\text{cost-residual value})}{(\text{useful life})}$
84	Accelerated depreciation- double declining balance method DDB depreciation= $\left(\frac{2}{\text{useful life}}\right)$(cost-accumulated depreciation)
85	Basic EPS= $\frac{(\text{net income-preferred dividends})}{(\text{weighted average number of common shares outstanding})}$
86	Diluted EPS= $\frac{(\text{Adjusted income for common shareholders})}{(\text{weighted average commom and potential common shares outstanding})}$ Diluted EPS= $\frac{([\text{Net income-preferred dividends}]+[\text{convertible preferred dividends}]+[\text{convertible debt interest}](1\text{-tax rate}))}{([\text{Weighted average shares}]+[\text{shares from conversion of converted preferred shares}]+[\text{shares from conversion of debt}]+[\text{shares issuable from stock options}])}$
	UNDERSTANDING CASHFLOW STATEMENTS
87	Free Cash flow to firm, FCFF= NI+ NCC+ Interest(1-Tax Rate) –FC Inv-WC Inv FCFF=CFO+ Interest(1-Tax Rate)-FC Inv NI= Net income NCC= Non cash charges FC Inv= Fixed capital investment WC Inv= Working Capital Investment
88	Free cash flow to equity, FCFE=CFO-FC Inv + net borrowing Net borrowing= debt issued- debt repaid

89	Performance Ratio: Cash flow to revenue= CFO/Net Revenue CFO= Cash flow from operations
90	Performance Ratio: Cash return on asset ratio= CFO/Average total assets
91	Performance Ratio: Cash return on equity ratio=CFO/Average total equity
92	Performance Ratio: Cash to income ratio: CFO/Operating Income
93	Cash flow per share= $\frac{\text{(CFO-Preferred Dividends)}}{\text{(Weighted Average Number Of Common Shares)}}$
94	Coverage Ratio: Debt coverage= $\frac{\text{CFO}}{\text{(Total Debt)}}$
95	Coverage Ratio: Interest coverage ratio: $\frac{\text{(CFO+interest paid+taxes paid)}}{\text{(interest paid)}}$ If interest paid is classified as a financing activity under ifrs, no interest adjustment is necessary
96	Reinvestment Ratio= $\frac{\text{CFO}}{\text{(Cash paid for long term assets)}}$
97	Debt payment Ratio= $\frac{\text{CFCFO}}{\text{(Cash long term debt repayment)}}$
98	Dividend Payment Ratio= $\frac{\text{CFO}}{\text{(Dividends paid)}}$
99	Investing and Financing Ratio= $\frac{\text{CFO}}{\text{(Cash outflow from investing and financing activities)}}$
	FINANCIAL ANALYSIS TECHNIQUES
	ACTIVITY RATIOS:
100	Receivables Turnover=net annual sales /average receivables
101	Days of sales outstanding= $\frac{365}{\text{(Receivables turnover)}}$
102	Inventory Turnover= $\frac{\text{(Cost of goods sold)}}{\text{(Average inventory)}}$
103	Days of inventory in hand= $\frac{365}{\text{(Inventory turnover)}}$

104	Payables turnover = $\frac{\text{Purchases}}{\text{(Average trade payables)}}$
105	Number of days of payables = $\frac{365}{\text{(Payable turnover)}}$
106	Total asset turnover = $\frac{\text{(Revenue)}}{\text{(Average total assets)}}$
107	Fixed asset turnover = $\frac{\text{Revenue}}{\text{(Average net fixed assets)}}$
108	Working capital turnover = $\frac{\text{Revenue}}{\text{(Average working capital)}}$
	LIQUIDITY RATIOS
109	Current Ratios = $\frac{\text{(Current Assets)}}{\text{(Current Liabilities)}}$
110	Quick Ratio = $\frac{\text{(Cash + Marketable Securities + Receivables)}}{\text{(Current Liabilities)}}$
111	Cash Ratio = $\frac{\text{(Cash + Marketable Securities)}}{\text{(Current Liabilities)}}$
112	Defensive Interval = $\frac{\text{(Cash + Marketable Securities + Receivables)}}{\text{(Average Daily Expenditures)}}$
113	Cash Conversion Cycle = (Days sales outstanding) + (days on inventory on hand) - (number of days of payables)
	SOLVENCY RATIOS
114	Debt to equity ratio = $\frac{\text{(Total debt)}}{\text{(Total Shareholders Equity)}}$
115	Debt To Capital = $\frac{\text{(Total debt)}}{\text{(Total Debt + Total Shareholders Equity)}}$
116	Debt To Assets = $\frac{\text{(Total Debt)}}{\text{(Total Assets)}}$
117	Financial Leverage = $\frac{\text{(Average Total Assets)}}{\text{(Average Total Equity)}}$
118	Interest Coverage Ratio = $\frac{\text{(Earnings Before Interest and taxes)}}{\text{(Interest payments)}}$
119	Fixed Charge Coverage = $\frac{\text{(Earnings Before Interest \& Taxes + Lease Payments)}}{\text{(Interest payments + Lease payments)}}$

	PROFITABILITY RATIOS
120	Net profit margin = $\frac{\text{(Net Income)}}{\text{Revenue}}$ Net income = earnings after taxes but before dividends
121	Gross Profit Margin = $\frac{\text{(Gross profit)}}{\text{Revenue}}$ Gross profit = Net Sales - COGS
122	Operating profit margin = $\frac{\text{(Operating Income (EBIT))}}{\text{Revenue}}$
123	Pretax margin = $\frac{\text{EBT}}{\text{Revenue}}$
124	Return on assets (ROA) = $\frac{\text{(Net Income)}}{\text{(Average Total Assets)}}$
125	Operating return on assets = $\frac{\text{(Operating Income)}}{\text{(Average Total Assets)}}$
126	Return on Total Capital = $\frac{\text{EBIT}}{\text{(Average Total Capital)}}$
127	Return On Equity = $\frac{\text{(Net Income)}}{\text{(Average Total Equity)}}$ Or Return On Equity = $\frac{\text{(Net Income)}}{\text{Revenue}} * \frac{\text{Revenue}}{\text{Equity}}$ = Net Profit Margin * Equity Turnover Return On Equity By Du Pont Equation, Return On Equity = $\frac{\text{(Net Income)}}{\text{Sales}} * \frac{\text{(Sales)}}{\text{Assets}} * \frac{\text{(Assets)}}{\text{Equity}}$ =Net Profit Margin*Asset Turnover*Leverage Ratio ROE By Extended Dupont Equation, ROE = $\frac{\text{(Net Income)}}{\text{EBT}} * \frac{\text{EBT}}{\text{EBIT}} * \frac{\text{EBIT}}{\text{Revenue}} * \frac{\text{Revenue}}{\text{(Total Assets)}} * \frac{\text{(Total Assets)}}{\text{(Total Equity)}}$ =Tax Burden *Interest Burden*EBIT Margin*Asset turnover*financial leverage
128	Return on common equity = $\frac{\text{(Net Income-Preferred Dividends)}}{\text{(Average Common Equity)}}$
129	Sustainable growth rate = RR*ROE RR = Retention rate =1-dividend payout

130	Coefficient of variation sales $= \frac{\text{(Standard deviation of operating income)}}{\text{(Mean sales)}}$
131	CV Operating Income $= \frac{\text{(Standard deviation of operating income)}}{\text{(mean operating income)}}$
132	CV Net Income $= \frac{\text{(Standard deviation of net income)}}{\text{(Mean net income)}}$
	INVENTORIES
133	COGS = beginning inventory + purchases - ending inventory
	LONG LIVED ASSETS
134	Depreciation methods, i) straight line and ii) ddb covered earlier. Ii) units of production depreciation = $\frac{\text{(Original cost-salvage value)}}{\text{(life in output units)}} * \text{Output units in the period}$
	INCOME TAXES
135	Effective tax rate $= \frac{\text{(Income tax expense)}}{\text{(Pretax income)}}$
136	Income tax expense = taxes payable + ΔDTL-ΔDTA DTL = Deferred tax liability DTA = Deferred tax asset
	CAPITAL BUDGETING
137	Profitability Index (PI) $= \frac{\text{(PV Of future cash flows)}}{\text{CF0}}$ $= 1 + \frac{\text{NPV}}{\text{CF0}}$
	COST OF CAPITAL
138	WACC = (wd)[kd(1-t)] + (wps)(kps) + (wcc)(Kcc) Wd = percentage of debt in capital structure. Wps = percentage of preferred stock in the capital structure. Wcc = percentage of common stock in the capital structure
139	After tax cost of debt = kd(1-t)
140	Cost of preferred stock (k_{ps}) $K_{ps} = D_{ps}/p$

141	Capital asset pricing model (CAPM) Kce=RFR+β[E(Rm)-RFR] Kce=Cost of equity capital RFR= Risk free rate E(Rm)= Expected return on market.
142	Dividend discount model, $Po = \frac{D1}{(k-g)}$ D1= Next year dividend. K=Required rate of return on common equity. g = Firm's expected constant growth rate.
143	Bond yield plus risk premium approach, K_{ce}=bond yield + risk premium
144	Asset Beta, $B_{Asset} = \beta_{Equity}^{\frac{1}{1+\frac{(1-t)D}{E}}}$ D/E= Comparable company's debt to equity ratio
145	Project Beta, $B_{Project} = \beta_{Asset}\ (1+(1-t)\frac{D}{E})$
146	Revised CAPM using country risk premium, K_{ce}=Rf+β[E(R_m)-RFR+CRP CRP= Country risk premium
147	$CRP = \frac{\text{(Annualised standard deviation of equity index of developing country)}}{\text{(Annualised standard deviation of sovereign bond Market in terms of the developed market currency)}}$ Sovereign yield spread= difference between the yields of government bonds in in the developing country and treasury bonds of similar maturities
148	Break Point (any time the cost of one of the components of the company's WACC changes.) $\text{Break Points} = \frac{\text{(Amount Of Capital at which the components cost of capital changes)}}{\text{(weight of the he component in the capital structure)}}$

	MEASURES OF LEVERAGE
149	Degree of operating leverage, $DOL = \frac{\text{(Percentage change in EBIT)}}{\text{(Percentage change in sales)}}$ DOL for a particular level of units, $DOL = \frac{Q(P-V)}{(Q(P-V)-F)} = \frac{(S-TVC)}{(S-TVC-F)}$ Q= Quantity of units sold P=Price per unit V= Variable cost per unit F= Fixed costs S= Sales TVC=Total variable costs
150	Degree of financial leverage, $DFL = \frac{\text{(Percentage change in EPS)}}{\text{(Percentage change in EBIT)}}$ DFL for particular level of operating units, $DFL = \frac{EBIT}{(EBIT-Interest)}$
151	Degree Of Total Leverage DTL=DOL+DFL $DTL = \frac{\text{(\% change in EBIT)}}{\text{(\% change in Sales)}} * \frac{\text{(\% change in EPS)}}{\text{(\% change in EBIT)}} = \frac{\text{(\% change in EPS)}}{\text{(\% Change in Sales)}}$ $DTL = \frac{Q(P-V)}{(Q(P-V)-F-I)} = \frac{(S-TVC)}{(S-TVC-F-I)}$
152	Breakeven Quantity Of Sales, $QBE = \frac{\text{(Fixed perating costs+Fixed financing costs)}}{\text{(Price-Variable cost per unit)}}$
	DIVIDENDS AND SHARE REPURCHASE BASICS
153	Eps after buyback= $\frac{\text{(Total earnings-After tax cost of funds)}}{\text{(Shares outstanding after buyback)}}$
	WORKING CAPITAL MANAGEMENT
154	Cost of trade credit=$(1+\frac{(\%discount)}{(1-\%discount)}$ 365/days past discount -1

	PORTFOLIO RISK AND RETURN: PART II
155	Expected return when one asset is invested in risky asset and one asset in risk free asset $E(R_p) = W_A E(R_A) + w_B E(R_B)$ $W_B = 1 - W_B$
156	Capital market line equation, $E(R_p) = Rf + \frac{(E(Rm)-Rf)}{(\sigma m)} \sigma p$
157	Total Risk = systematic risk + unsystematic risk
158	General form of multifactor model, $E(Ri)-Rf = \beta_{i1} * E(\text{Factor 1}) + \beta_{i2} * E(\text{factor 2}) + \ldots\ldots\ldots B_{ik} * E(\text{Factor k})$
159	Equation of SML, $E(Ri) = RFR + \frac{(E(Rm)-RFR)}{(\text{Variance of Market})}$ (Cov i,mkt)
160	M Square = $(Rp-Rf) \frac{(\text{Std Dev of m})}{(\text{Std Dev of p})} - (Rm-Rf)$
161	Treynor Measure = $\frac{(Rp-Rf)}{\beta p}$
162	Jenson's Alpha = $\alpha p = Rp-[Rf+\beta p(Rm-Rf)]$
	MARKET ORGANISATION AND STRUCTURE
163	Margin call price = Po $\frac{((1-\text{initial margin}))}{((1-\text{maintenance margin}))}$ Po = initial purchase price
	SECURITY MARKET INDICES
164	Compounded Returns, $R_p = (1+R1)(1+R2)(1+R3)\ldots\ldots (1+Rk)-1$ K = last sub period
165	Price weighted Index = $\frac{(\text{Sum of stock prices})}{(\text{Number of stocks in index adjusted for splits})}$
166	Market weighted Index, Current index value = $\frac{(\text{Current total market value of index stocks})}{(\text{Base year total market value of index stocks})}$ *Base year index value
167	Equal weighting index, New index value = Initial index value (1 + Change in index)

168	Dividend discount model, One year holding period: $Vo = \frac{Dt}{((1+ke)\ )} + \frac{(Year\ End\ Price)}{((1+ke))}$ Vo= Current stock value Dt=Dividend at time t Ke=Required rate of return Two year holding period DDM, $Value = \frac{D1}{((1+ke)\ )} + \frac{D2}{(1+ke)2} + \frac{P2}{((1+ke)2)}$ Multi-stage dividend discount model: $Value = \frac{D1/}{(1+ke)\ )} + \frac{D2}{(1+ke)2} + \frac{Dn}{((1+ke)n\ )} + \frac{Pn}{((1+ke)n)}$ $Pn = \frac{(Dn+1)}{(Ke-gc)}$
169	Free cash to equity, FCFE= net income+ depreciation-increase in working capital-fixed capital investment-debt principal repayments+ new debt issues FCFE=CFO-FC investment + net borrowing CFO= Cash flow from operations.
170	Preferred stock value= $\frac{Dp}{kp}$ Dp= Fixed dividend Kp=Required rate of return
171	Enterprise Value (EV) EV= market value of common and preferred stock + market value of debt –cash and short term investment
172	Trailing P/E= $\frac{(Market\ price\ per\ share)}{(EPS\ over\ previous\ 12\ months)}$
173	Leading P/E= $\frac{(Market\ price\ per\ share)}{(Forecast\ EPS\ over\ next\ 12\ months)}$
174	P/B Ratio= $\frac{(Market\ value\ of\ equity)}{(Book\ value\ of\ equity)} = \frac{(Market\ price\ per\ share)}{(Book\ value\ per\ share)}$ Book value of equity= common shareholders equity = (total assets- total liabilities)-preferred stock

175	P/S Ratio $= \frac{\text{(Market value of equity)}}{\text{(Total sales)}}$
176	P/CF Ratio $\frac{\text{(Market value of equity)}}{\text{(Cash flow)}}$
	INTRODUCTION TO FIXED INCOME VALUATION
177	Price of annual coupon bond, $\text{Price} = \frac{\text{Coupon}}{((1+\text{YTM}))} + \frac{\text{Coupon}}{((1+\text{YTM})2)} + \ldots\ldots\ldots + \frac{\text{(Principal} + \text{Coupon)}}{((1+\text{YTM})n)}$ YTM = Yield to maturity Price of semi-annual coupon bond, $\text{Price} = \frac{\text{Coupon}}{\left(1+\frac{\text{YTM}}{2}\right)} \left(1+\frac{\text{Coupon}}{\frac{\text{YTM}}{2}}\right)2 + \ldots\ldots\ldots + \frac{\text{Principal} + \text{Coupon}}{\left(1+\frac{\text{YTM}}{2}\right)n*2}$
178	Full Price = Flat price + Accrued interest
179	Current Yield $= \frac{\text{(Annual cash coupon payment)}}{\text{(Bond price)}}$
180	Relation between forward rates and spot rates, $(1+s_z)=(1+S')(1+1y1y)$
181	Option Value = z spread –OAS
	UNDERSTANDING FIXED INCOME RISK AND RETURN
182	Modified duration, For annual pay bond: Modified duration = Macualay duration/ (1+YTM) For semi-annual bond, ModDursemi=MacDur/(1+ YTM/2) V¬_ = price increase V+=price decrease V0=current price Approximate modified duration $= \frac{(V¬\_ - V+)}{2V0\Delta ytm}$
183	Approximate % change in bond price = -ModDur*ΔYTM
184	Effective duration $= \frac{(V\_ - V+)}{2Vo\Delta Curve}$

185	Portfolio duration= $W_1D1_+ W_2D_2 +\ldots\ldots_+ W_nD_n$ W= Weight= Full price/total value D=Duration on bond
186	Money duration= annual modified duration *full price of bond position Money Duration per 100 units of par value= annual modified duration * full price per 100 of par value
187	Price value of a basis point (PVBP)= Average of decrease in value of bond when YTM increases and increase in value of bond when YTM decreases
188	Approximate Convexity= $V_- -V_+ -2V_{o/} (\Delta curve)^2 Vo$
189	% change in Bond Price (when duration and convexity are given) %ΔBond Value= -duration (Δspread)+1⁄2convexity (Δspread)2
190	Duration Gap= Macaulay duration-Investment horizon
191	Return impact (%change in bond price) For small spread changes, Return impact ≈ -Modified duration *ΔSpread For larger spread changes, Return impact≈ -Modified duration *ΔSpread + 1⁄2convexity (Δspread)2
192	Yield spread = liquidity premium + credit spread
193	Payment to the long at settlement, $\text{(notional principal)} \dfrac{\text{(floating-foward)}\left(\frac{\text{days}}{360}\right)}{1+[\text{(floating)}\left(\frac{\text{days}}{360}\right)}$ Days= number of days in the loan term
194	Intrinsic value of call option, C= max [0,S-X] C= Intrinsic Value of Call option S= Spot price X= Strike price
195	Intrinsic value of a put option, P=max[0,X-S] P=intrinsic value of put

196	Option value= intrinsic value+ time value
197	Put-call parity: C+X/(1+RFR)t =S+P C= Call P=Put S=Stock X=Present value
198	Put call parity with assets cashflows, C+X/(1+RFR)t =(So –PVcf) +P
199	Plain vanilla interest rate swap, (Net fixed rate payment)t = (Swap rate- LIBORt-1) $\frac{((\text{Number of days})}{360)^*}$ notional principal

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