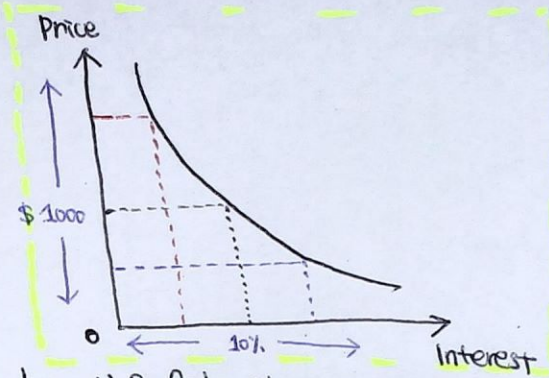
Bond Valuation

1. A bond is a long- term contract under which a borrower agrees to make payments of interest and principal, on specific dates, to bondholders.

① Treasury bonds
② Corporate bonds
③ Municiple bonds
④ Foreign bonds



① Treasury bonds ≈ government bonds are issued by U.S. federal government; No default risk (or close to ∅)
(≈ credit risk)

② Corporate bonds are issued by corporations; default risk exists! The larger the default (≈ credit) risk, the higher interest rate the issuer must pay!

③ Municiple (≈ munis) bonds are issued by State/ local governments; default risk exists, but tax benefits.

④ Foreign bonds are issued by foreign governments or corporations. default risk and currency risk exist :)

2. Key Characteristics of Bonds;

① Par value ≈ (stated) face value ; The par value represents the amount of money the firm borrows and promises to repay on the maturity date.

"generally $1,000"

② Coupon Interest Rate ; the yield paid by a fixed-income security

ex) Perla-Cindi Corporation's bonds have a $1,000 par value, and they pay $100 in interest each year. The bond's coupon interest is $100, so its coupon interest rate is 10% (= $100 / $1000)

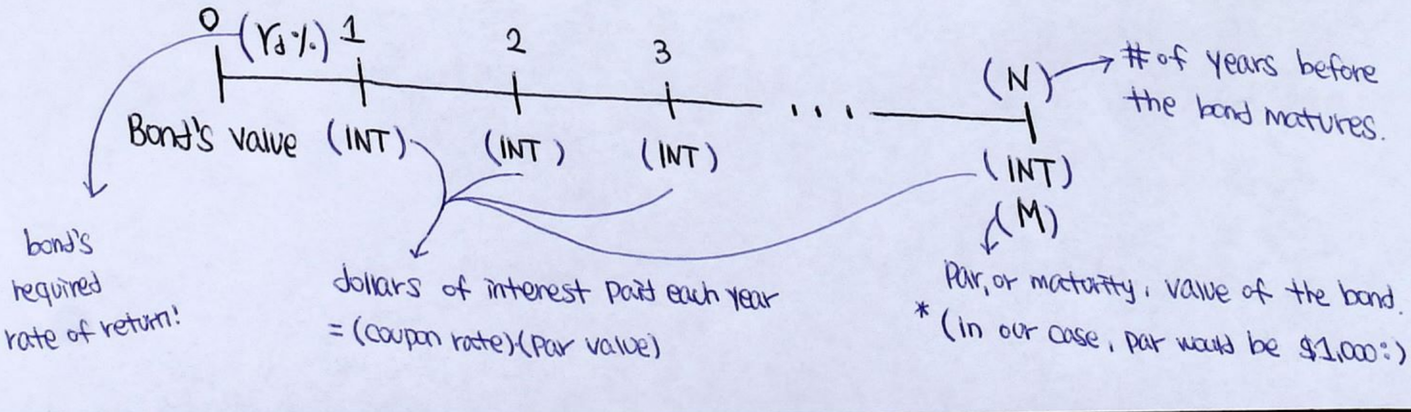
* (The coupon payment, which is fixed at the time the bond is issued, remains in force during the life of the bond!)

③ Maturity Date ; Bonds usually have a specified maturity date on which the par value must be repaid.

ex) Perla-Cindi Corporation's bonds issued on January 5, 2011, will mature on January 5, 2026 ; thus, they have a 15-year maturity at the time they are issued.

* 3. How to value a bond?

*** The value of any financial asset — a stock, a bond, a lease, or even a physical asset such as an apartment building or a piece of machinery — is simply the present value of the cash flows the asset is expected to produce.



$$V_{Bond} = \frac{INT}{(1+r_d)^1} + \frac{INT}{(1+r_d)^2} + \cdots + \frac{INT}{(1+r_d)^N} + \frac{M}{(1+r_d)^N}$$

$$= \sum_{t=1}^{N} \frac{INT}{(1+r_d)^t} + \frac{M}{(1+r_d)^N} = INT\left[\frac{1}{r_d} - \frac{1}{r_d(1+r_d)^N}\right] + \frac{M}{(1+r_d)^N}$$

what the heck?

how to use this crab?

* Let's take an example!!

Pelra-Cindi Corporation issued a 15-year bond with an annual coupon rate of 10% and a par value of $1,000. To find the value of its bond by using a formula above;

$$(V_{Bond}) = \frac{\$100}{(1+10\%)^1} + \frac{\$100}{(1+10\%)^2} + \cdots + \frac{\$100}{(1+10\%)^{15}} + \frac{\$1000}{(1+10\%)^{15}}$$

$$= \sum_{t=1}^{15} \frac{\$100}{(1+10\%)^t} + \frac{\$1,000}{(1+10\%)^{15}} = \$100\left[\frac{1}{10\%} - \frac{1}{10\%\,(1+10\%)^{15}}\right] + \frac{\$1000}{(1+10\%)^{15}}$$

$$= \$1,000$$

$\boxed{N}$	$\boxed{I/Y}$	$\boxed{PV}$	$\boxed{PMT}$	$\boxed{FV}$
15	10	−1000	100	1000

4. Bond Yields – Terminology?

① Yield to Maturity (YTM) ; "What rate of interest would you earn on your investment if you bought the bond and held it to maturity?" This is the interest rate discussed by investors when they talk about rate of return.

(YTM is usually same as the market rate of interest, r_d)

ex)

N	I/YR	PV	PMT	FV
14	5	-1494.93	100	1000

② Yield to Call (YTC) ; If current interest rates are well below an outstanding bond's coupon rate, then a callable bond is likely to be called, and investors will estimate its expected rate of return as the yield to call (YTC) rather than as the yield to maturity (YTM)

③ Current Yield ; annual interest payment divied by the bond's current price.

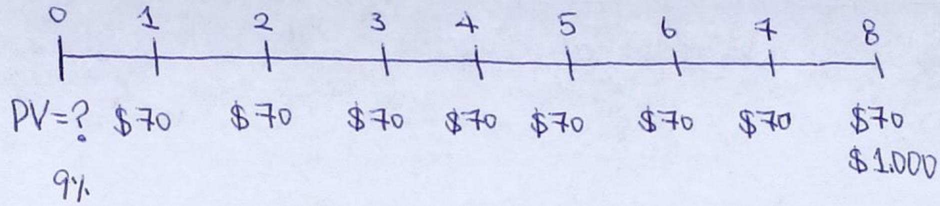
ex) Pelra and Cindi corporation's bonds with a 10% coupon were "currently" selling \$985, then Current Yield would be

$$\$100 / 985 = 0{,}1015 = 10.15\%$$

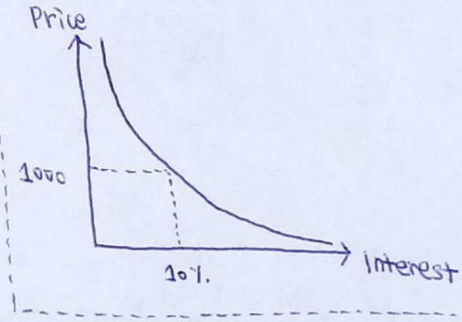
※ Compared with Yield to Maturity, Current Yield provides information regarding the amount of cash income that a bond will generate in a given year, but it does not provide an accurate measure of the bond's total expected return, the yield to maturity.
(Current yield + capital gains yield = Yield to maturity)

SECTION 7-3: Bond Valuation

1. A bond that matures in 8 years has a par value of $1,000 and an annual coupon payment of $70; its market interest rate is 9%. What is its price?



2. A bond that matures in 12 years has a par value of $1,000 and an annual coupon of 10%; the market interest rate is 8%. What is its price?



	N	I/YR	PV	PMT	FV
Q1:	8	9	?	70	1000
Q2:	12	8	?	100	1000

Q1: 889.30

Q2: 1150.72

SECTION 7-4: Bond Yields

2. Halley Enterprises' bonds currently sell for $975. They have a 7-year maturity, an annual coupon of $90, and a par value of $1,000. What is their yield to maturity?

N	I/YR	PV	PMT	FV
7	?	-975	90	1000

I/YR = Yield to Maturity = 9.51%

3a. The Henderson Company's bonds currently sell for $1,275. They pay a $120 annual coupon, have a 20-year maturity, and a par value of $1,000, but they can be called in 5 years at $1,120. What are their YTM (1) and their YTC (2)?

	N	I/YR	PV	PMT	FV
(1)	20	8.99	-1275	120	1000
(2)	5	7.31	-1275	120	1120

3b. If the yield curve remained flat which rate would investors expect to earn?

(1) 8.99%

* (2) 7.31%

SECTION 7-5: Changes in Bond Values Over Time

2a. Last year a firm issued 20-year, 8% annual coupon bonds at a par value of $1,000. Suppose that one year later the going market interest rate drops to 6%. What is the new price of the bonds assuming that they now have 19 years to maturity?

N	I/YR	PV	PMT	FV
19	6	($1223.16)	80	1000

2b. Suppose that one year after issue, the going market interest rate is 10% (rather than 6%). What would the price have been?

N	I/YR	PV	PMT	FV
19	10	($832.70)	80	1000

SECTION 7-6: Bonds with Semi-Annual Coupons

2. Hartwell Corporation's bonds have a 20-year maturity, an 8%* semiannual coupon, and a face value of $1,000. The going nominal annual interest rate (r_d) is 7%. What is the bond's price?

N $20 \times 2 = 40$

I/YR $7\% \div 2 = 3.5$

PV ($1106.78)

PMT $8\% \times 1000 \div 2 = 40$

FV $1000