I. LINEAR RELATIONSHIPS

A. Slope-Intercept Form:

1. $y = mx + b$

   where
   y = dependent variable
   x = independent variable
   m = slope
   b = y-intercept

2. Slope = rise/run =vertical/ horizontal = $\Delta y / \Delta x$

3. y-intercept (x=0)

   i. $y = m(0) + b$
   ii. $y = b$

4. X-intercept (y=0)

   i. $y = mx + b$
   ii. $0 = mx + b$
   iii. $-MX = b$
   iv. $(1/-m)(-mx) = b(-1/m)$
   v. $X = b/-m = a$

B. Example 1

1. $y = 2x + 10$

   i. $m = \text{slope} = \Delta y / \Delta x = 2$
   ii. y-intercept (x=0): $y = 10$
   iii. x-intercept (y=0): $0 = -2x + 10$ or $X = -5$

C. Example 2 (consumption function):

1. $C = 100 + .8y$

where
C = consumption
y = income

i. y-intercept ($y=0$): $C=100$
ii. Slope=$\Delta C / \Delta y = .8$ (slope=marginal propensity to consume-MPC)

D. Example 3

1. $100 = 5Q_A + 10Q_B$

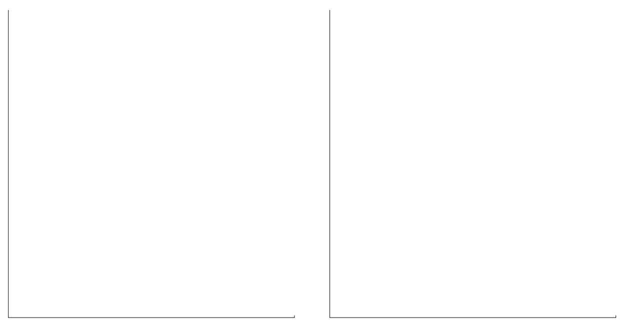
   income=\$100: price of Q_A is \$5 and price of Q_B is \$10

   i. get in slope intercept form: $5Q_A = 100 - 10\ Q_B$
   ii. divide both sides by 5: $(1/5)5Q_A = (1/5)(100 - 10Q_B)$
   iii. $Q_A = 20 - 2Q_B$
   iv. slope = $\Delta Q_A/\Delta Q_B = -2$

II. NON LINEAR FUNCTIONS

A. Aside

1. zero vs. infinite slope:



2. tangency: touches function at one point

slope at A - negative and relatively close to zero

slope at B - negative, in fact, more negative than at pt. A so that it is close to negative infinity

B. Example of Nonlinear Function: Profit Function

slope at A - positive

slope at B - positive but smaller

slope at C - zero

slope of D - negative

slope of E - negative and smaller

C. Example 2: Production Possibility Frontier (PPF)

shows we can change one good for another in production

slope at A - negative and relatively close to zero

slope at B - negative and more negative than A

slope at C negative an relatively close to infinity