SAMPLE MATERIAL;

- **Marginal rate of transformation (MRT);** minus the slope of the PPF, or the rate at which one good in the economy can be technologically exchanged for another
  - $MRT_{lC} = MP_N = -(the\ slope\ of\ the\ PPF)$
  - The representative firm chooses the labor input to maximise profits in equilibrium by setting;
    - $MP_N = w$
  - Thus in equilibrium the slope of the PPF must equal to w, because;
    - $MRT_{lC} = MP_N = w$
  - Thus the firm chooses labor demand equal to $h - l^*$ and produces so;
    - $Y^* = zF(K, h - l^*)$
  - Which results in a maximised profits given by;
    - $\pi^* = zF(K, h - l^*) - w(h - l^*)$ which is total revenue minus total cost of labor.
  - We can also infer that from a consumers perspective;
    - $MRS_{lC} = MRT_{lC} = MP_N$
    - Or in words the marginal rate of substitution between labor and consumption is equal to the marginal rate of transformation between labor and consumption which is equal to the marginal product of labor
    - Because consumers and firms face the same wage the rate which consumers are willing trade leisure for consumption is also the rate at which leisure can be converted into consumption goods by firms using production technology
- **Equilibrium;**
  - In the equilibrium the firm and the worker need to come to an agreement regarding wage paid and this is largely done through nash bargaining theory. This is done through surplus; total surplus available, the consumer surplus and producer surplus.
    - The consumer surplus is wage – employment insurance benefit = $(w - b)$
    - The firms surplus is the profit it makes = $z - w$
    - The total surplus which is consumer and producer surplus added = $(z - b)$
  - Now the worker and firm agree to a contract so the workers surplus is a fraction (a) of the total surplus
    - $w - b = a(z - b)$
  - If we solve the formula above for that wage we get;
    - $w = az + (1 - a)b$
  - The last step of the equilibrium is to substitute the above formula for w into the final formula of the consumer section $(P(Q) = p_c w + (1 - p_c)b = b + em(1, j)(w - b))$ and the final formula of the firm section of $(em\left(\frac{1}{j}, 1\right) = \frac{k}{z-w})$ to get the following;
    - $P(Q) = b + em(1, j)a(z - b)$
    - $em\left(\frac{1}{j}, 1\right) = \frac{k}{(1-a)(z-b)}$
  - We can now work backwards to get other variables of interest. The unemployment rate is;
    - $U = \frac{Q(1-p_C)}{Q} = 1 - em(1, j)$
    - $U = \frac{Q(1-p_C)}{Q} = (1 - p_C) = 1 - e(j^*)^{1-\alpha}$
  - The vacancy rate is the number of vacancies that go unfilled relative to the number of jobs that were originally posted and is given by;
    - $v = \frac{A(1-p_f)}{A} = 1 - em\left(\frac{1}{j}, 1\right)$
    - $v = \frac{A(1-p_f)}{A} = \left(1 - p_f\right) = 1 - e(j^*)^{-\alpha} = 1 - \frac{e}{(j^*)^{\alpha}}$
  - Finally the aggregate ouput is $Y = Mz$ which is the number of Matches multiplied by the output produced in each match. We can express this as;
    - $Y = em(Q, A)z = Qem(1, j)z$
- An increase in the UI benefit (*b*) – an increase in *b* reduces the surplus the firm receives from a match, which reduces labor market tightness. Then the increase shifts the curve up, the labor force could increase or decrease.
- An increase in productivity (*z*) – an increase in productivity acts to increase the surplus from a match for both the workers and firms. Labor market tightness increases, and the curve shifts up so that the labor force must increase.
- Decrease in matching efficiency (*e*) – this act shifts the curves down with labor market tightness and the labor force both decreasing.
- **ABS methods of calculating GDP;**
  1. The production method – the sum of the value of all goods and services produced by industries in the economy in a year minus the cost of goods and services used in the productive process, leaving the value added by the industries.
  2. The expenditure method – the sum of the total expenditure on final goods and services by households, investors, government and net exports (the expenditure on exports minus the expenditure on imports) $Y = C + I + G + NX$
  3. The income method – the sum of the income generated from the production of goods and services, which includes profits, wages and other employee payments, income from rent and interest earned.
- **Components of GDP;** The ABS divides its statistics on GDP into four categories to help analyse fluctuations;
  - GDP equation - $Y = C + I + G + NX$
  - Consumption – spending by households on G&S but not on new houses.

- Investment – firm spending on new factories, building (capital stock) etc & consumers on new houses.
- Government purchases – spending by federal, state and local governments on goods and services.
- Net Exports – $(NX = exports - imports)$ negative NX is a leakage from a domestic economy as $ is flowing out of country.

- **Crowding out;** when increased government spending sees government directly competing for resources with the rest of the economy. This discourages private spending by firms and consumers.
- **Current account surplus;** net exports (exports minus imports) plus net factor payments (net income from abroad).
- **National income Identities;**
  - Disposable income –
    - $Y^d = Y + NFP + TR + INT - T$
  - Private savings -
    - $S^P = Y^d - C$
    - $S^P = Y + NFP + TR + INT - T - C$
  - Government savings –
    - $S^G = T - TR - INT - G$
  - Government deficit –
    - $D = -T + TR + INT + G$
  - National savings –
    - $S = S^P + S^G$
      - $S = Y + NFP + TR + INT - T - C + T - TR - INT - G$
      - $S = Y + NFP - C - G$
      - $S = I + NX + NFP$
      - If the economy is closed then $S = I$
      - $NX + NFP = current\ account\ surplus/deficit$
- **Golden rule quantity of capital per worker;** the quantity of capital per worker that maximizes consumption per worker (utility) in the steady state because the equilibrium level of capital may not always maximize utility.
- **Golden rule savings rate;** the savings rate that implies consumption per worker is maximized in the steady state of a competitive equilibrium
- **Dynamic decision;** a decision made by a consumer or firm for more than one time period
- **Consumption good;** a single good that represents an aggregation
- **Leisure;** time spent not working in the market
- **Representative consumer;** a stand in for all consumers in the economy
- **Consumer's optimization problem;** making his or herself as well off as possible given his or her budget constraint.
- **Utility function properties;**
  1. More is always preferred to less – having more of a good never makes someone worse off unless in the case of a economic bad
  2. The consumer likes diversity in their bundle – balanced bundles are provide more utility than those which are heavily skewed to consumption or leisure.
  3. Consumption and leisure are normal goods – meaning as income rises the quantity of consumption and leisure will increase as they are normal goods. In contrast a inferior good is one which is purchased less as income rises
- **The representative firm;**
  - In the current period, the representative firm produces output according to the production function;
    - $Y = zF(K, N)$
    - K is the capital the firm starts the period with and thus the quantity is given
  - Similarly, output in the future period is given by;
    - $Y' = z'F(K', N')$
  - The future capital stock is given by;
    - $K' = (1 - d)K + I$
    - Because the second period is the end of the model we assume $(1 - d)K'$ which is the capital left over at the end of the second period can be converted one-for-one back to consumption goods which can be sold.
- **The representative firms investment decision;**
  - *Marginal cost of investment;* the profit forgone by the firm in the current period from investing in an additional unit of capital
    - $MC(I) = 1$
    - The marginal cost of investment is what the firm gives up in terms of the present value of profits, V, by investing in one unit of capital in the current period.
  - *Marginal benefit from investment;* the future marginal product of capital plus 1-d where d is the depreciation rate
    - $MB(I) = \frac{MP'_K + 1 - d}{1 + r}$
  - The firm continues to invest until the marginal cost of investment is equal to the marginal benefit;
    - $\frac{MP'_K + 1 - d}{1 + r} = 1$
  - *Net marginal product of capital;* the marginal product of capital minus the depreciation rate. When we have MB=MC we will see the Net marginal product of capital $MP'_K - d$ equal the real interest rate;
    - $MP'_K - d = r$
    - **THIS IS THE OPTIMAL INVESTMENT RULE FORMULA.**