1. Introduction
   a. *This is an important chapter as it explains how we make decisions by comparing the psychological benefits of alternatives to their costs choosing those that increase our welfare.*
   b. *Regrettably, we will not have the time to cover it in class.*
   c. This method is important for all decisions not only those affecting consumers.
      i. Have you ever turned down a higher paying job because of the nature or location of the job?
   d. This illustrates one of the central principles of economics: people attempt to maximize their welfare subject to their constraints.
      i. In this case, we talk about utility instead of welfare and the constraint is income.
   e. Mankiw applies the framework developed in this chapter to three household decisions:
      i. Do all demand curves slope downward?
      ii. How do wages affect labor supply?
      iii. How do interest rates affect household saving?

2. The Budget Constraint: What the Consumer Can Afford
   a. **Figure 1: The Consumer's Budget Constraint.** P. 441
   b. Def: Budget constraint is the limit on the consumption bundles that a consumer can afford. P. 440
   c. *Since I = P_x*Q_x + P_y*Q_y, then*
      (1) the budget line can be defined as Q_y = I/P_y - (P_x/P_y)*Q_x.
      (a) I/P_y is the intercept shifting up as income increases and
      (i) If income (I) increases, the intercept increases and the budget line shifts up--and out to the right.
      (b) - P_x/P_y is the slope.
      If the price of x (P_x) increases the slope of the budget line increases pivoting around the intercept on the horizontal axis.

1. Preferences: What the Consumer Wants
   a. Representing preferences with indifference curves
      i. Def: Indifference curve is a curve that shows consumption bundles that give the consumer the same level of satisfaction. P. 442
      ii. Def: Marginal rate of substitution is the rate at which a consumer is willing to trade one good for another (_Q_y/ Q_x). P. 442
      iii. **Figure 2: The Consumer's Preferences.** P. 442
          (1) *The change in total utility between two very close bundles of goods is \( \Delta TU = MU_x*\Delta Q_x + MU_y*\Delta Q_y. \)
          MU is the marginal utility, which is the rate of change of total utility with respect to changes in the quantities of the goods.
          (1) Along an indifference curve, \( \Delta TU = 0 \), so this equation becomes \( \Delta Q_y/\Delta Q_x = -MU_y/MU_x. \)
(2) So the slope along the indifference curve, $\Delta Q_y/\Delta Q_x$, is equal to the negative of the ratio of the marginal utilities of the two goods, $-MU_y/MU_x$.

b. Four Properties Of Indifference Curves
   i. Higher indifference curves are preferred to lower ones.
   ii. Indifference curves are downward sloping.
   iii. Indifference curves do not cross.
   iv. Indifference curves are bowed inward (convex to the origin).

   (1) Figure 3: The Impossibility of Intersecting Indifference Curves. P. 443
   iv. Indifference curves are bowed inward (convex to the origin).

   (1) Figure 4: Bowed Indifference Curves. P. 444

c. Two extreme examples of indifference curves
   i. Perfect substitutes are two goods with straight line indifference curves. P. 445
   (1) Figure 5: Perfect Substitutes and Perfect Complements. P. 445
   ii. Perfect complements are two goods with right angle indifference curves. P. 445

2. Optimization: What the consumer chooses
   a. The consumer's optimal choices
   b. Figure 6: The Consumer's Optimum. P. 446
   c. FYI: Utility: An Alternative Way to Represent a Consumer's Preferences, P. 447
      i. Along an IC, the total utility is constant.
      ii. Maximizing utility and getting to the highest indifference curve as the same thing.
      iii. $MRS = P_x/P_y$
      iv. $MU_x/MU_y = P_x/P_y$
      v. $MU_x/P_x = MU_y/P_y$
   vi. The consumer chooses consumption of the two goods so that the MRS equals the ratio of the prices.
      (1) This will be when $-MU_x/MU_y = -P_x/P_y$ or $MU_x/P_x = MU_y/P_y$.
      (2) So if $MU_x/P_x > MU_y/P_y$, the consumer has an incentive to shift purchases away from y and toward x.
      (3) So if $MU_x/P_x < MU_y/P_y$, the consumer has an incentive to shift purchases away from x and toward y.
      (4) As a result they will move toward the combination of x and y that maximizes their welfare.

d. How Changes in Income Affect the Consumer's Choices
   i. Figure 7: An Increase in Income. P. 448
      ii. Def: Normal good is a good for which an increase in income raises the quantity demanded. P. 448
      iii. Def: Inferior good is a good for which an increase in income reduces the quantity demanded. P. 448
   iv. Figure 8: An Inferior Good. P. 449

e. How Changes in Prices Affect the Consumer's Choices
   i. Figure 9: A Change in Price. P. 450

f. Income and Substitution Effects
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i. Def: Income effect is the change in consumption that results when a price change moves
the consumer to a higher or lower indifference curve. P. 450

ii. Def: Substitution effect is the change in consumption that results when a price change
moves the consumer along a given indifference curve to a point with a new marginal rate
of substitution. p. 450

iii. Table 1: Income and Substitution Effects When the Price of Pepsi Falls. P. 451

iv. Figure 10: Income and Substitution Effects. P. 451

g. Deriving the Demand Curve
i. Figure 11: Deriving the Demand Curve. P. 452

3. Three Applications
a. Do All Demand Curves Slope Downward?
i. Def: Giffen good is a good for which an increase in the price raises the quantity
demanded. P. 453.
(1) Figure 12: A Giffen Good. P. 454
(2) It is rare, if it occurs at all.
(3) Case Study: The Search for Giffen Goods, P. 454

b. How Do Wages Affect Labor Supply?
i. An increase in wages has two effects:
ii. A substitution effect as the cost of leisure has increased encouraging people to work more
and
iii. An income effect that increases the demand for all normal goods, including leisure,
thereby, encouraging people to work less.

iv. The supply of labor can be backward bending, if the substitution effect initially dominates
the income effect, but at higher wages levels their effects are reversed.

i. Figure 13: The Work Leisure Decision. P. 455

ii. Case Study: Income Effects on Labor Supply: Historical Trends, Lottery
Winners, and the Carnegie Conjecture, P. 457

iii. Figure 14: An Increase in the Wage, P. 456

iv. In the News: Backward sloping Labor Supply in Kiribati, P. 458

c. How Do Interest Rates Affect Household Saving?
i. The substitution effect of an increase in the interest rate reduces now the cost of future
goods, thereby, increasing the demand for future goods: increase their saving.

ii. However, there can also be an income effect for people with wealth: they can buy more of
current and future goods, so they might elect to consumer more current goods: reduce their
saving.

iii. The outcome depends on their combined impact, but the substitution effect usually
dominates.

iv. The relevant interest rate is the real interest rate, which is the nominal interest adjusted for
inflation, and it does not change by very much.

v. Figure 15: The Consumption Saving Decision. P. 459

vi. Figure 16: An Increase in the Interest Rate. P. 460
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4. Conclusion: Do People Really Think this Way?  
   i. The test of a theory is in its applications, which are provided here.

5. Summary