ECON 301
Intermediate Microeconomics
Spring 2007
Problem set #4: answers

Name: ______________________________________

1. Perloff (fourth edition): question 1 page 103
   (a) Imperfect substitutes
   (b) Complements
   (c) Independent (neither complements nor substitutes)
   (d) Perfect substitutes for many consumers

2. Perloff (fourth edition): question 8 page 103
   When all prices and income double, the budget constraint remains unchanged. The consumer is
different between income of $100 and prices of $10 and $20 for X and Z, respectively, and income
of $50 and prices of $5 and $10 for X and Z.

   The Original budget constraint is $Y = p_zQ_z + p_cQ_c$; Normally Ralph buys 1 pizza and 2
   colas, which means $Q_z = 1$ and $Q_c = 2$. Therefore $Y = p_z + 2p_c$. New budget constraint:
   $Y = p_z + 0.5p_z(Q_z - 1) + p_cQ_c = 0.5p_z + 0.5p_zQ_z + p_cQ_c$. What Ralph will choose when faced with
the new constraint depends on his indifference curve.

4. Perloff (fourth edition): question 23 page 104
   See Figure 1. $e_1$ will be the same as $e_2$ if the tangent point of the indifference curve and the
budget line is on the solid region of the budget line. If the tangent point is on the dashed region,
$e_2$ will be different to $e_1$, and $e_2$ will be the corner solution.

![Figure 1](image)
5. Perloff (fourth edition): problem 33 page 104

(a) \(50S + 50T = 500\)
(b) \(MRS = -(\partial U / \partial S) / (\partial U / \partial T) = -T/S\)
(c) \(MRT = -p_x/p_t\)

\[T/S = 50/50\]
\[T = S\]

Substitute into budget constraint
\[50T + 50T = 500\]
\[T = 5, S = 5\]

6. Perloff (fourth edition): problem 34 page 104

There are two steps to solve these problems. First, set \(MRS = MRT\), and then satisfy the budget constraint. See Figure 4.16.

\[MRS = -MU_x / MU_z\]
\[MRS = -(20XZ/10X^2)\]
\[MRT = -(10/5)\]
\[-(20XZ/10X^2) = -(10/5)\]

\[Z = X\]
\[10X + 5Z = 150\]

substituting \(Z\) for \(X\), \(15Z = 150\), \(Z = 10\) and \(X = 10\).
7. For each of the utility function below, draw a set of indifference curves showing utility levels \( U = 12, U = 16, U = 24 \).

1. \( U = XY \Rightarrow Y = U/X \). For \( U = 12 \), \( Y = 12/X \). For \( U = 16 \), \( Y = 16/X \). For \( U = 24 \), \( Y = 24/X \).

2. \( U = X + Y \Rightarrow Y = U - X \). For \( U = 12 \), \( Y = 12 - X \). For \( U = 16 \), \( Y = 16 - X \). For \( U = 24 \), \( Y = 24 - X \).
3. Commodities in (2) are perfect substitutes.