Quiz

20 points, 40 minutes. Closed books, notes, calculators.
Indicate your reasoning, using clearly written words as well as math.

1. (8 pts) Let $X = \{x, y, z\}$, and consider a choice correspondence C defined on $\mathfrak{B} = 2^X \backslash \varnothing$ (the set of all nonempty subsets of X), with $C(B) \neq \varnothing$ for all $B \in \mathfrak{B}$. Suppose

$$C(\{x,y\}) = \{x\}, \quad C(\{y,z\}) = \{y\}, \quad C(\{x,z\}) = \{z\}.$$

   Say which of the following is correct, and prove your answer:

   (a) $(\mathfrak{B}, C(\cdot))$ must violate WARP.

   (b) $(\mathfrak{B}, C(\cdot))$ must satisfy WARP.

   (c) $(\mathfrak{B}, C(\cdot))$ may or may not satisfy WARP.

2. (12 pts) A consumer consumes goods x and y, and has the utility function on $\mathbb{R}^2_+$ defined by $u(x,y) = \min(3x, x + y, 3y)$. This utility function can also be written as

$$u(x,y) = \begin{cases} 3y & \text{if } y < \frac{1}{2}x \\ x + y & \text{if } \frac{1}{2}x \leq y < 2x \\ 3x & \text{if } 2x \leq y \end{cases}$$

   The price of good y is fixed at $p_y = 1$.

   (a) (4 pts) Graph the indifference curve for a utility level $U \geq 0$, labeling as many points as possible.

   (b) (4 pts) Find the expenditure function $e(p_x, U)$ for all $(p_x, U) \geq (0,0)$.

   (c) (4 pts) Find the indirect utility function $v(p_x, m)$ for $(p_x, m) \geq (0,0)$.