Producer Theory, Consumer Theory, and Decision Theory

Problem Set 1

1. For each function below, determine whether it is concave, quasiconcave, or neither. (Assume $x, y \geq 0$.)

   (a) $f(x, y) = x\sqrt{y}$

   (b) $f(x, y) = u(x) + v(y)$, with $u(x)'' \leq 0$ and $v''(y) \leq 0$ for all $x, y \geq 0$.

   (c) $f(x) = 2x - (x + 1)^{-1} + (x + 1)^{-2}$, $x > 0$

2. Let us define $h(x) = x^3 + x$ and $g(x) = -2x$, both with domains $\mathbb{R}$. Show that $h(x)$ and $g(x)$ are both quasiconcave, while $h(x) + g(x)$ is not.

3. J-R, A1.47, p. 456.

4. M-W-G, 1.B.3, p. 15

5. Show that $f(x, y) = \min\{x, y\}$ is a concave function.