Question 1

a) Consider the function $f(x) = x^{\frac{1}{\alpha+\beta+\gamma}}$.

We can denote $u'(x) = f(x) = (x_1-b_1)^{\frac{\alpha}{\alpha+\beta+\gamma}}(x_2-b_2)^{\frac{\beta}{\alpha+\beta+\gamma}}(x_3-b_3)^{\frac{\gamma}{\alpha+\beta+\gamma}}$

since $f(x)$ is a monotone transformation, it will preserve the maximum

Thus maximizing $u'(x)$ is equivalent to maximizing $u(x)$, which means

we can set $\alpha+\beta+\gamma=1$

b) Assume $\alpha+\beta+\gamma=1$. and setup the Lagrangian problem using the log transformation of $u'(x)$.

$$\mathcal{L} = \alpha \ln(x_1-b_1) + \beta \ln(x_2-b_2) + \gamma \ln(x_3-b_3) + \lambda(y - p_1x_1 - p_2x_2 - p_3x_3).$$

since $h_\alpha = p_i \neq 0$, we can have interior solutions.

(FONC): $\frac{\alpha}{x_1-b_1} = \lambda p_1$ ① $\qquad y = p_1x_1+p_2x_2+p_3x_3$ ④

$\frac{\beta}{x_2-b_2} = \lambda p_2$ ②

$\frac{\gamma}{x_3-b_3} = \lambda p_3$ ③

②/① $\Rightarrow \frac{x_1-b_1}{x_2-b_2} = \frac{p_2}{p_1}\frac{\alpha}{\beta} \Rightarrow x_1-b_1 = \frac{\alpha}{\beta}\frac{p_2}{p_1}(x_2-b_2)$ ④

②/③ $\Rightarrow \frac{x_3-b_3}{x_2-b_2} = \frac{p_2}{p_3}\frac{\gamma}{\beta} \Rightarrow x_3-b_3 = \frac{\gamma}{\beta}\frac{p_2}{p_3}(x_2-b_2)$ ⑤

plugging ④,⑤ into budget constraint, we can get

$$\frac{\alpha}{\beta}p_2(x_2-b_2) + p_2(x_2-b_2) + \frac{\gamma}{\beta}p_2(x_2-b_2) + p_1b_1+p_2b_2+p_3b_3 = y$$

$$\Rightarrow \left(\frac{1-\beta}{\beta}+1\right)p_2(x_2-b_2) = y-m$$

$$\Rightarrow x_2-b_2 = \frac{\beta}{p_2}(y-m). \quad ⑥$$

plugging ⑥ back into ④,⑤, we have

$$x_1 - b_1 = \frac{\alpha}{P_1}(y-m)$$

$$x_3 - b_3 = \frac{\gamma}{P_3}(y-m).$$

Now, since $h(x)$ is a linear function of $x_i$, it's quasi-concave

The objective function is $\alpha \ln(x_1-b_1) + \beta \ln(x_2-b_2) + \gamma \ln(x_3-b_3)$ is a linear combination of log functions. It's concave. So the FONC is also sufficient

The expenditure function: since $x_1 = \frac{\alpha}{P_1}(y-m)+b_1$, $x_2 = \frac{\beta}{P_2}(y-m)+b_2$,

$$x_3 = \frac{\gamma}{P_3}(y-m)+b_3.$$

we have

$$\left[\frac{\alpha}{P_1}(y-m)\right]^{\alpha}\left[\frac{\beta}{P_2}(y-m)\right]^{\beta}\left[\frac{\gamma}{P_3}(y-m)\right]^{\gamma} = u.$$

$$\Rightarrow \left(\frac{\alpha}{P_1}\right)^{\alpha}\left(\frac{\beta}{P_2}\right)^{\beta}\left(\frac{\gamma}{P_3}\right)^{\gamma}(y-m) = u.$$

$$\Rightarrow \quad y = P_1 b_1 + P_2 b_2 + P_3 b_3 + u\left(\frac{\alpha}{P_1}\right)^{-\alpha}\left(\frac{\beta}{P_1}\right)^{-\beta}\left(\frac{\gamma}{P_3}\right)^{-\gamma}$$

The indirect utility function:

$$V(P, y) = (y - P_1 b_1 - P_2 b_2 - P_3 b_3)\left(\frac{\alpha}{P_1}\right)^{\alpha}\left(\frac{\beta}{P_2}\right)^{\beta}\left(\frac{\gamma}{P_3}\right)^{\gamma}.$$

c) Roy's identity.

$$\frac{\partial V}{\partial P_1} = \left(\frac{\alpha}{P_1}\right)^{\alpha}\left(\frac{\beta}{P_2}\right)^{\beta}\left(\frac{\gamma}{P_3}\right)^{\gamma}(-b_1) + \alpha\left(-\frac{\alpha}{P_1^2}\right)\left(\frac{\alpha}{P_1}\right)^{\alpha-1}\left(\frac{\beta}{P_2}\right)^{\beta}\left(\frac{\gamma}{P_3}\right)^{\gamma}(y-P_1b_1-P_2b_2-P_3b_3)$$

$$= \left(\frac{\alpha}{P_1}\right)^{\alpha}\left(\frac{\beta}{P_2}\right)^{\beta}\left(\frac{\gamma}{P_3}\right)^{\gamma}\left[-b_1 - \frac{\alpha}{P_1}(y-P_1b_1-P_2b_2-P_3b_3)\right]$$

$$\frac{\partial V}{\partial y} = \left(\frac{\alpha}{P_1}\right)^{\alpha}\left(\frac{\beta}{P_2}\right)^{\beta}\left(\frac{\gamma}{P_3}\right)^{\gamma}$$

$$\Rightarrow \quad x_1 = -\frac{\partial V/\partial P_1}{\partial V/\partial y} = b_1 + \frac{\alpha}{P_1}(y-P_1b_1-P_2b_2-P_3b_3) \qquad \text{(QED)}$$

d) Take $x_1$ for example.

① $x_1 = \frac{\alpha}{P_1}(y - P_1 b_1 - P_2 b_2 - P_3 b_3) + b_1$

$$x_1(kP_1, kP_2, kP_3, ky) = \frac{\alpha}{kP_1}(ky - kP_1 b_1 - kP_2 b_2 - kP_3 b_3) + b_1$$

$$= \frac{\alpha}{P_1}(y - P_1 b_1 - P_2 b_2 - P_3 b_3) + b_1 = x_1(P_1, P_2, P_3, y)$$

② $\sum_i P_i x_i = \left[\frac{\alpha}{P_1}(y - P_1 b_1 - P_2 b_2 - P_3 b_3) + b_1\right] P_1 + \left[\frac{\beta}{P_2}(y - P_1 b_1 - P_2 b_2 - P_3 b_3) + b_2\right] P_2$

$+ \left[\frac{\gamma}{P_3}(y - P_1 b_1 - P_2 b_2 - P_3 b_3) + b_3\right] P_3$

$= y.$

③ Let assume $u^*$ to be the optimal utility that ~~the~~ consumers can obtain, and the corresponding demands will be $x_1^*$ and $x_2^*$. ($x_1^*$ could be equal or unequal to $x_2^*$), $x_1^*, x_2^* \in X(P, y)$

for the point of $\alpha x_1^* + (1-\alpha) x_2^*$,

By the definition of quasi-concave, we have

$$u(\alpha x_1^* + (1-\alpha) x_2^*) \geq \min\{u(x_1^*), u(x_2^*)\} = u^*$$

Meanwhile $p[\alpha x_1^* + (1-\alpha) x_2^*] = \alpha p x_1^* + (1-\alpha) p x_2^* = \alpha y + (1-\alpha) y$
$= y.$

since we have a point within the same budget constraint and yield at least the same utility, $\alpha x_1^* + (1-\alpha) x_2^* \in X(P, y)$

$\Rightarrow X(P, y)$ is convex.

If we assume $x_1^* \neq x_2^*$, then under strict quasi-concavity, we'll have

$$u(\alpha x_1^* + (1-\alpha) x_2^*) > \min\{u(x_1^*), u(x_2^*)\} = u^*$$

and $p(\alpha x_1^* + (1-\alpha) x_2^*) = y.$

So here we've a point within the same budget constraint, but generate a strictly higher utility. In order to maximize utility, consumers should choose $\alpha x_1^* + (1-\alpha) x_2^*$, instead of $x_1^*$ and $x_2^*$.

$\Rightarrow$ $x_1^*, x_2^* \notin x(p, y)$, Contradiction!

$\Rightarrow$ $x_1^* = x_2^*$ under strict quasiconcavity

$\Rightarrow$ $x(p, y)$ has one single element

④ $$v(\lambda p_1, \lambda p_2, \lambda p_3, \lambda y) = (\lambda y - \lambda p_1 b_1 - \lambda p_2 b_2 - \lambda p_3 b_3)\left(\frac{\alpha}{\lambda p_1}\right)^{\alpha}\left(\frac{\beta}{\lambda p_2}\right)^{\beta}\left(\frac{\gamma}{\lambda p_3}\right)^{\gamma}$$

$$= (y - p_1 b_1 - p_2 b_2 - p_3 b_3)\left(\frac{\alpha}{p_1}\right)^{\alpha}\left(\frac{\beta}{p_2}\right)^{\beta}\left(\frac{\gamma}{p_3}\right)^{\gamma}$$

$$= \lambda^0 (p_1, p_2, p_3, y) \quad \text{where } \alpha+\beta+\gamma=1.$$

⑤ $$\frac{\partial v}{\partial y} = \left(\frac{\alpha}{p_1}\right)^{\alpha}\left(\frac{\beta}{p_2}\right)^{\beta}\left(\frac{\gamma}{p_3}\right)^{\gamma} > 0$$

$$\frac{\partial v}{\partial p_1} = \left(\frac{\alpha}{p_1}\right)^{\alpha}\left(\frac{\beta}{p_2}\right)^{\beta}\left(\frac{\gamma}{p_3}\right)^{\gamma}\left[-b_1 - \frac{\alpha}{p_1}(y - p_1 b_1 - p_2 b_2 - p_3 b_3)\right] \leq 0$$

By symmetry, $\frac{\partial v}{\partial p_i} \leq 0$, $\forall i \neq 1$.

⑥ remember that a monotone transformation can retain the property of quasiconvexity / quasiconcavity.

Let $g(p) = -p$, $\begin{cases} f_1(p) = \ln(y + b_1 p_1 + p_2 b_2 + p_3 b_3) \\ f_2(p) = \alpha \ln p_1 \\ f_3(p) = \beta \ln p_2 \\ f_4(p) = \gamma \ln p_3 \end{cases}$ they're quasiconcave in $p$.

$f_1(g(p))$, $-f_2(p)$, $-f_3(p)$, $-f_4(p)$ are quasiconvex in $p$

$\Rightarrow$ $f_1(g(p)) - f_2(p) - f_3(p) - f_4(p)$ is quasiconvex

$\Rightarrow$ $\alpha \ln \alpha + \beta \ln \beta + \gamma \ln \gamma + f_1(g(p)) - f_2(p) - f_3(p) - f_4(p)$ is quasiconvex in $p$, and we denote it as $w$

since $w = \log v(p, y)$, we have $v(p, y)$ is quasiconvex in $p$.

Question 2)

$$e(p,u) = a(p) + u\,b(p)$$

$$v(p,y) = \frac{y - a(p)}{b(p)}$$

$$\frac{\partial v}{\partial y} = \frac{1}{b(p)}$$

$$\frac{\partial v}{\partial p_i} = \frac{b(p)(-a_i(p)) + (y-a(p))\,b_i(p)}{[b(p)]^2}$$

$$\Rightarrow x_i = -\frac{\partial v/\partial p_i}{\partial v/\partial y} = \frac{-\frac{b(p)[-a_i(p)] + (y-a(p))\,b_i(p)}{(b(p))^2}}{\frac{1}{b(p)}} = a_i(p) + (y-a(p))\frac{b_i(p)}{b(p)}$$

$$\eta = \frac{\partial x_i}{\partial y}\,\frac{y}{x_i} = \frac{b_i(p)}{b(p)}\,\underbrace{\frac{y}{a_i(p) + (y-a(p))\frac{b_i(p)}{b(p)}}}_{A} = \underbrace{\frac{b_i(p)}{b(p)} \cdot \frac{1}{\frac{a_i(p)}{y} + \left(1-\frac{a(p)}{y}\right)\frac{b_i(p)}{b(p)}}}_{B}$$

When $y \to 0$, $\eta \to 0$.

when $y \to \infty$, $\eta \to 1$.

$$\lim_{y\to 0} A = \frac{0}{\sim} = 0$$

$$\lim_{y\to \infty} B = \frac{b_i(p)}{b(p)} \cdot \frac{1}{\frac{b_i(p)}{b(p)}} = \frac{\cancel{b_i(p)}}{\cancel{b(p)}} \cdot \frac{\cancel{b(p)}}{\cancel{b_i(p)}} = 1$$

Question 3.

a) The budget constraint is $x_1 + \frac{1}{1+r}x_2 = y_1 + \frac{1}{1+r}y_2$.

$$\Rightarrow (1+r)(y_1 - x_1) + y_2 - x_2 = 0.$$

Then we need to setup the problem as

$$\mathcal{L} = U(x_1, x_2) + \lambda\left[(1+r)(y_1-x_1) + y_2 - x_2\right]$$

(CQ) $h_{x_1} = -(1+r) \neq 0$

$h_{x_2} = -1 \neq 0$.

According to the primal-dual results,

$$[L_{\alpha x},\ L_{\alpha\lambda}]\begin{bmatrix} x_\alpha \\ \lambda_\alpha \end{bmatrix}$$ is symmetric, positive semi-definite.

$\alpha = [r,\ y_1,\ y_2)$

$$h_\alpha = [h_r,\ h_{y_1},\ h_{y_2}] = [y_1 - x_1,\ 1+r,\ 1].$$

$$\therefore h_\alpha u = [y_1 - x_1,\ 1+r,\ 1]\begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix} = 0 \Rightarrow u_3 = u_1(x_1 - y_1) - u_2(1+r).$$

$$L_r = \lambda(y_1 - x_1)$$
$$L_{y_1} = \lambda(1+r)$$
$$L_{y_2} = \lambda$$

$$L_{rx_1} = -\lambda, \quad L_{rx_2} = 0, \quad L_{r\lambda} = y_1 - x_1$$
$$L_{y_1x_1} = 0, \quad L_{y_1x_2} = 0, \quad L_{y_1\lambda} = 1+r$$
$$L_{y_2x_1} = 0, \quad L_{y_2x_2} = 0, \quad L_{y_2\lambda} = 1$$

$$\Rightarrow \begin{pmatrix} u_1 \\ u_2 \\ u_1(x_1-y_1) - u_2(1+r) \end{pmatrix}' \begin{pmatrix} -\lambda & 0 & y_1-x_1 \\ 0 & 0 & 1+r \\ 0 & 0 & 1 \end{pmatrix} \underbrace{\begin{pmatrix} \partial x_1/\partial r & \partial x_1/\partial y_1 & \partial x_1/\partial y_2 \\ \partial x_2/\partial r & \partial x_2/\partial y_1 & \partial x_2/\partial y_2 \\ \partial \lambda/\partial r & \partial \lambda/\partial y_1 & \partial \lambda/\partial y_2 \end{pmatrix}}_{X_\alpha} \begin{pmatrix} u_1 & u_2 & u_1(x_1-y_1) - u_2(1+r) \end{pmatrix}' \geq 0.$$

since $\begin{pmatrix} u_1 & u_2 & u_1(x_1-y_1)-u_2(1+r) \end{pmatrix} = \begin{pmatrix} u_1 & u_2 \end{pmatrix} \begin{pmatrix} 1 & 0 & x_1-y_1 \\ 0 & 1 & -(1+r) \end{pmatrix}$

$$\Rightarrow (u_1 \ u_2) \begin{pmatrix} 1 & 0 & x_1-y_1 \\ 0 & 1 & -(1+r) \end{pmatrix} \begin{pmatrix} -\lambda & 0 & y_1-x_1 \\ 0 & 0 & 1+r \\ 0 & 0 & 1 \end{pmatrix} X_\alpha \begin{pmatrix} 1 & 0 \\ 0 & 1 \\ x_1-y_1 & -(1+r) \end{pmatrix} \begin{pmatrix} u_1 \\ u_2 \end{pmatrix} \geq 0.$$

$$\Rightarrow (u_1 \ u_2) \underbrace{\begin{pmatrix} -\lambda & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} \partial x_1/\partial r & \partial x_1/\partial y_1 & \partial x_1/\partial y_2 \\ \partial x_2/\partial r & \partial x_2/\partial y_1 & \partial x_2/\partial y_2 \\ \partial \lambda/\partial r & \partial \lambda/\partial y_1 & \partial \lambda/\partial y_2 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & 1 \\ x_1-y_1 & -(1+r) \end{pmatrix}} \begin{pmatrix} u_1 \\ u_2 \end{pmatrix} \geq 0.$$

$$= -\lambda \underbrace{\begin{pmatrix} \partial x_1/\partial r + \partial x_1/\partial y_2 \, (x_1-y_1) & \partial x_1/\partial y_1 - (1+r)\, \partial x_1/\partial y_2 \\ 0 & 0 \end{pmatrix}}_{\text{symmetric. positive semi-definite.}}$$

since $\lambda \geq 0$

$$\Rightarrow \begin{pmatrix} \frac{\partial x_1}{r} + \frac{\partial x_1}{\partial y_2}(x_1-y_1) & \frac{\partial x_1}{\partial y_1} - (1+r)\frac{\partial x_1}{\partial y_2} \\ 0 & 0 \end{pmatrix}$$ is symmetric, negative semi-definite.

$$\Rightarrow \begin{cases} \frac{\partial x_1}{\partial y_1} - (1+r)\frac{\partial x_1}{\partial y_2} = 0 & ① \\ \frac{\partial x_1}{r} + \frac{\partial x_1}{\partial y_2}(x_1-y_1) \leq 0 & ② \end{cases}$$

subsitute ① into ②, we can get

$$\frac{\partial x_1}{\partial r} + \frac{x_1-y_1}{1+r}\frac{\partial x_1}{\partial y_1} \leq 0.$$

since we don't know the sign of $(x_1-y_1)\frac{\partial x_1}{\partial y_1}$, we cannot sign $\frac{\partial x_1}{\partial r}$ either.

b). if we know the utility function, we can actually knows the form of $\frac{\partial x_1}{r}$, $\frac{\partial x_1}{\partial y_1}$

set up the primal problem $\quad \max u(x_1)+\beta u(x_2)$

$\quad$ s.t. $(1+r)(y_1-x_1)+y_2-x_2=0$

$$\Rightarrow L = u(x_1)+\beta u(x_2) + \lambda\left[(1+r)(y_1-x_1)+y_2-x_2\right]$$

$$\begin{cases} L_{x_1} = u'(x_1) - \lambda(1+r) \\ L_{x_2} = \beta u'(x_2) - \lambda \\ L_\lambda = (1+r)(y_1-x_1)+y_2-x_2 \\ L_{x_1x_1} = u''(x_1), \quad L_{x_1x_2}=0, \quad L_{x_1\lambda} = -(1+r). \\ L_{x_2x_1} = 0, \quad L_{x_2x_2} = \beta u''(x_2), \quad L_{x_2\lambda} = -1 \\ L_{\lambda x_1} = -(1+r), \quad L_{\lambda x_2} = -1 \quad L_{\lambda\lambda} = 0 \\ h_{x_1} = -(1+r) \neq 0, \quad h_{x_2} = -1 \neq 0. \end{cases}$$

$$\Rightarrow \begin{pmatrix} x_{1r} & x_{1y_1} & x_{1y_2} \\ x_{2r} & x_{2y_1} & x_{2y_2} \\ \lambda_r & \lambda_{y_1} & \lambda_{y_2} \end{pmatrix} = -L_{xx}^{-1} L_{x\alpha} = -\begin{pmatrix} u''(x_1) & 0 & -(1+r) \\ 0 & \beta u''(x_2) & -1 \\ -(1+r) & -1 & 0 \end{pmatrix}^{-1} \begin{pmatrix} -\lambda & 0 & 0 \\ 0 & 0 & 0 \\ y_1-x_1 & 1+r & 1 \end{pmatrix}$$

$$= -\frac{1}{|H|} \begin{pmatrix} -1 & 1+r & \beta u''(x_2)(1+r) \\ +(1+r) & -(1+r)^2 & u''(x_1) \\ \beta u''(x_2)(1+r) & u''(x_1) & \beta u''(x_2) u''(x_1) \end{pmatrix} \begin{pmatrix} -\lambda & 0 & 0 \\ 0 & 0 & 0 \\ y_1-x_1 & 1+r & 1 \end{pmatrix}$$

$$\Rightarrow \quad x_{1y_1} = -\frac{1}{|H|} \beta u''(x_2)(1+r)^2$$

$$x_{1r} = -\frac{1}{|H|} \left( \lambda + \beta u''(x_2)(1+r)(y_1-x_1) \right)$$

since $u''(x_2) < 0$ by concavity, $|H| > 0$ by (SOSC), $\beta > 0$.

We can get $\frac{\partial x_1}{\partial y_1} > 0$.

c) since $\frac{\partial u^*}{\partial r} = \frac{\partial L^*(r, y_1, y_2)}{\partial r} = \lambda^*(r, y_1, y_2)\left(y_1 - x_1^*(r, y_1, y_2)\right)$

The consumer will be better off ($\frac{\partial u^*}{\partial r} > 0$) if he is a net saver ( $y_1 - x_1^*(r, y_1, y_2) > 0$. )

Question 4.

a). By using budget constraint, we can solve for $x_3$ easily.

b) since $x_1(\lambda p_1, \lambda p_2, \lambda p_3, \lambda w) = 100 - \frac{5\lambda p_1}{\lambda p_3} + \frac{\beta \lambda p_2}{\lambda p_3} + \frac{\delta \lambda w}{\lambda p_3}$

$$= 100 - \frac{5p_1}{p_3} + \beta \frac{p_2}{p_3} + \delta \frac{w}{p_3}$$

$$= x_1(p_1, p_2, p_3, w)$$

$$x_2(\lambda p_1, \lambda p_2, \lambda p_3, \lambda w) = \alpha + \frac{\beta \lambda p_1}{\lambda p_3} + \frac{\lambda \gamma p_2}{\lambda p_3} + \delta \frac{\lambda w}{\lambda p_3}$$

$$= \alpha + \frac{\beta p_1}{p_3} + \frac{\gamma p_2}{p_3} + \frac{\delta w}{p_3}$$

$$= x_2(p_1, p_2, p_3, w)$$

(QED.)

c). since the slutsky matrix should be symmetric and negative semidefinite, we should have $S_{12} = S_{21}$, $S_{11} \leq 0$.

$$S_{12} = \frac{\partial x_1}{\partial p_2} + \frac{\partial x_1}{\partial w} \cdot x_2 = \frac{\beta}{p_3} + \frac{\delta}{p_3}\left(\alpha + \frac{\beta p_1}{p_3} + \frac{\gamma p_2}{p_3} + \frac{\delta w}{p_3}\right)$$

$$S_{21} = \frac{\partial x_2}{\partial p_1} + \frac{\partial x_2}{\partial w} x_1 = \frac{\beta}{p_3} + \frac{\delta}{p_3}\left(100 - \frac{5p_1}{p_3} + \beta\frac{p_2}{p_3} + \delta\frac{w}{p_3}\right)$$

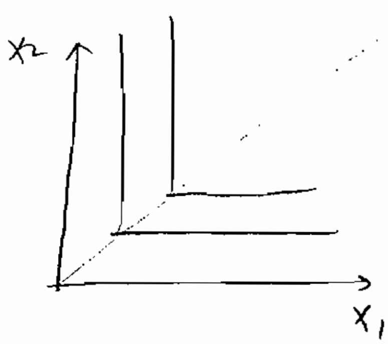
By $S_{12} = S_{21}$, we have $\begin{cases} \beta = -5 \\ \gamma = \beta = -5 \\ \alpha = 100 \end{cases}$

$$S_{11} = \frac{\partial x_1}{\partial p_1} + \frac{\partial x_1}{\partial w} x_1 = \frac{-5}{p_3} + \frac{\delta}{p_3}\left(100 - \frac{5p_1}{p_3} - 5\frac{p_2}{p_3} + \delta\frac{w}{p_3}\right) \leq 0$$

for $\forall \frac{p_1}{p_3}, \frac{p_2}{p_3}$,

$\Rightarrow \delta = 0$

d).




e) since there's no income effect on $x_3$, one guess could be

$$u(x_1, x_2, x_3) = \min\{x_1, x_2\} + x_3.$$

NOTES ON GRADING:

Question 1: Part C

Part 3: Please look at AK carefully. Everyone who was "close" to the correct answer received 4.5 or 5 pts. However, make sure you can answer it fully.

Part 1-2, 4-6:

You needed to show these properties for <u>this</u> particular functional form.

Otherwise, you are simply copying the <u>generalized</u> proofs from the text or notes.

If you showed it in general, I took off partial points (1/2 - 1 pt) for each sub question.

Question 2

If you demonstrated how this particular E(p,u) could be written in the Gorman Form, you received 1 pt. e.c.