56:271 Nonlinear Programming
Quiz #8-- Fall 2003

Indicate true (+) or false (o):

_____ 1. A posynomial function is always positive.

_____ 2. The dual of a posynomial GP problem has one orthogonality equation for each primal variable.

_____ 3. A polynomial function is always a posynomial, but a posynomial function is not always a polynomial.

_____ 4. It is possible that the information provided by the optimal solution of the dual of a posynomial GP problem is not sufficient to compute the primal solution, in which case another ("subsidiary") problem must be solved to obtain additional information.

_____5. If the posynomial GP dual problem is infeasible, then the primal GP problem's objective function is unbounded below.

_____ 6. The dual of an unconstrained posynomial GP problem has only linear equality plus nonnegativity constraints.

_____ 7 . A signomial function is always positive.

_____ 8. The dual of a posynomial GP problem is always feasible.

_____ 9. If a primal GP constraint is slack, then all the weights δ_t of the terms in that constraint must be zero.

_____ 10. If all posynomials in a (posynomial) GP problem are condensed into single terms, then it is always possible to rewrite the resulting problem as an LP problem.

_____ 11 . If a posynomial function is "condensed" into a monomial, the monomial function (if not equal) is an *overestimate* of the posynomial function.

_____ 12. If all posynomials in a (posynomial) GP problem are condensed into single terms, then the resulting problem has a feasible region which includes the original feasible region.

13. Which of the functions below are convex? *circle*: a b c d e f g
14. Which of the functions below are concave? *circle*: a b c d e f g
15. Which of the functions below are separable? *circle*: a b c d e f g

a. $v(\delta,\lambda)=\prod_{t=1}^{T}\left(\frac{c_t}{\delta_t}\right)^{\delta_t}\prod_{k=1}^{K}\lambda_k^{\lambda_k}$

b. $\ln v(\delta,\lambda)=\sum_{t=}^{T}\left(\delta_t\ln c_t-\delta_t\ln\delta_t\right)+\sum\lambda_k\ln\lambda_k$

c. $v(\delta,\lambda)=\prod_{t=1}^{T}\left(\frac{c_t}{\delta_t}\right)^{\delta_t}\prod_{k=1}^{K}\left(\sum_{t\in[k]}\delta_t\right)^{\sum_{t\in[k]}\delta_t}$

d. $\ln v(\delta,\lambda)=\sum_{t=}^{T}\left(\delta_t\ln c_t-\delta_t\ln\delta_t\right)+\sum\left(\sum_{t\in[k]}\delta_t\right)\ln\left(\sum_{t\in[k]}\delta_t\right)$

e. $\sum_{t\in[k]}c_t\prod_{i=1}^{n}x_i^{a_{ij}}$

f. $\sum_{t\in[k]}c_te^{z_t}$

g. $\sum_{t}\delta_t\ln\delta_t$