Name _____

56:271 Nonlinear Programming
Quiz #3 – Fall 2003

Indicate whether true (+) or false (o):

___ 1. A function which has more than one local minimum cannot be convex.
___ 2. The Hessian matrix evaluated at a local minimum must be positive semidefinite.
___ 3. Newton's method for minimization requires the computation of second partial derivatives.
___ 4. The Newton-Raphson method for solving nonlinear equations requires the computation of second partial derivatives.
___ 5. Newton's method with linesearch for minimization requires the computation of second partial derivatives.
___ 6. Quasi-Newton methods for minimization requires the computation of second partial derivatives.
___ 7. Two successive directions used by Newton's method will be orthogonal (perpendicular).
___ 8. Two successive directions used by the steepest descent method will be orthogonal (perpendicular).
___ 9. If minimizing a quadratic function of n variables, Newton's method will require n iterations.
___ 10. If minimizing a quadratic function of *n* variables, the steepest descent method will require no more than *n* iterations.

Match the formula used by the algorithms below for computing the search direction from x^t at iteration t.

___ 11. Newton's method
___ 12. Steepest Descent method
___ 13. Conjugate gradient (Fletcher-Powell) method
___ 14. Davidon-Fletcher-Powell (Quasi-Newton) method

a. $d^t = \nabla f\left(x^t\right)$

b. $d^t = -\left[\nabla^2 f\left(x^t\right)\right]^2 \nabla f\left(x^t\right)$

c. $d^t = -\nabla f\left(x^t\right) + \dfrac{\left\|\nabla f\left(x^t\right)\right\|^2}{\left\|\nabla f\left(x^{t-1}\right)\right\|^2} d^{t-1}$

d. $d^t = \left[\nabla^2 f\left(x^t\right)\right] \nabla f\left(x^t\right)$

e. $d^t = -\left[\nabla^2 f\left(x^t\right)\right]^{-1} \nabla f\left(x^t\right)$

f. $d^t = -Q\ \nabla f\left(x^t\right)$

g. $d^t = -\nabla f\left(x^t\right)$

h. $d^t = \nabla f\left(x^t\right) + d^{t-1}$

i. $d^t = -\dfrac{\left\|\nabla f\left(x^t\right)\right\|^2}{\left\|\nabla f\left(x^{t-1}\right)\right\|^2} \nabla f\left(x^t\right)$