```
function alpha=linesearch_secant(grad,x,d)
%Line search using secant method

epsilon=10^(-4); %line search tolerance
max = 100; %maximum number of iterations
alpha_curr=0;
alpha=0.001;
dphi_zero=feval(grad,x)'*d;
dphi_curr=dphi_zero;

i=0;
while abs(dphi_curr)>epsilon*abs(dphi_zero),

     alpha_old=alpha_curr;
     alpha_curr=alpha;
     dphi_old=dphi_curr;
     dphi_curr=feval(grad,x+alpha_curr*d)'*d;
     alpha=(dphi_curr*alpha_old-dphi_old*alpha_curr)/(dphi_curr-dphi_old);
     i=i+1;
     if i >= max & abs(dphi_curr)<abs(dphi_zero),
       disp('Line search terminating with number of iterations:');
       disp(i);
       break;
     end
   end %while
   %-------------------------------------------------------------------
```

grad - gradient of fcn
x - initial search point
d - direction to search

$(\nabla f(\underline{x}))^T \underline{d}$

stop when $\left| \underline{d}^T \nabla f(\underline{x}+\alpha \underline{d}) \right| \leq \varepsilon \left| \underline{d}^T \nabla f(\underline{x}) \right|$

$$\alpha^{k+1} = \frac{g(\alpha^k)\alpha^{k-1} - g(\alpha^{k-1})\alpha^k}{g(\alpha^k) - g(\alpha^{k-1})}$$

$$g(\alpha) = \left(\nabla f(\underline{x}+\alpha \underline{d})\right)^T \underline{d}$$