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function [f_all,gnorm_all] = gradmeth(fun, x0, tol, maxit)
% Gradient method with backtracking line search.
%
% Authour: Terrence Alsup
% Date: March 10, 2020
% File: gradmeth.m

x = x0;
[f, g] = fun(x); % Get the starting values.
gnorm = norm(g);

f_all(1) = f;
gnorm_all(1) = gnorm;

it = 1;
% Check the stopping condition after each iteration.
while it <= maxit && gnorm > tol
    t = linesearch(fun, x, -g); % Backtracking linesearch for step
    length.
    x = x - t*g;                % The gradient descent update.

    [f, g] = fun(x);
    gnorm = norm(g);
    f_all(it + 1) = f;
    gnorm_all(it + 1) = gnorm;

    it = it + 1;
end

end
```

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