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MATH 565 Continuous Optimization
Homework 1

1. Problem 6
2. Problem 8
3. Problem 12
4. For the quadractic function
$$f(\underline{x}) = \frac{1}{2}\underline{x}^T \underline{\underline{B}}\underline{x} - \underline{x}^T \underline{b}$$
where $\underline{\underline{B}} \in \mathbb{R}^{n \times n}$ is symmetric positive definite, show that the Newton search direction with $\alpha = 1$ satisfies the sufficient decrease assumption (3.4) for any $c_1 \leq \frac{1}{2}$ and the curvature conditions (3.5) for any $c_2 > 0$.
5. Consider the function:
$$f(\underline{x}) = 20(x_2 - x_1^2)^2 + (1 - x_1)^2$$
Write a MATLAB steepest descent code to find the minimizer of this function. The function be in the form

```
xstar = SteepestDescent(f, x0, TOL, MaxIters)
```

Use $\underline{x_0} = (1.2, 1.2)^T$
6.