PS 6

Due: Fri, Mar 27

Note: While it is not assigned, you may wish to look at problem 10 if you're still thinking about Project 2.

1: By the book Book section 8.4, problem 7, parts (a), (b), and (d). For part (d), you may also assume the initial vector v_0 is non-negative.

2: Simply SVD Consider the iteration

```
for k=1:kmax
  u = A*v; s = norm(u); u = u/s;
  v = A'*u; s = norm(v); v = v/s;
end
```

Argue that `u`, `v`, and `s` correspond to the first left and right singular vectors u_1 and v_1 and the dominant singular value σ_1, assuming $\sigma_1 > \sigma_2$. What is the rate of convergence?

2: Subspace iteration Implement orthogonal iteration on a m-dimensional space (see the book, page 239). Your function should have the interface

```
function [V,R] = p6subspace(A, m, maxiter, rtol)
```

and should iterate until either `maxiter` iterations have been reached or until the approximation $V^{(k)}$ satisfies the tolerance

$$\|AV^{(k)} - V^{(k)}R^{(k)}\|_F < \text{rtol}.$$

You should start your iteration with a random orthogonal basis, which you can compute with the line

```
[V,R] = qr(randn(n,m), 0);
```