PS 3

Due: Weds, Feb 11

1: By the book Book section 2.5, p10, 11; section 4.6, p16.

2: Definitions Let $\hat{x} = 32$ be regarded as an approximation to the positive solution for $f(x_*) = x_*^2 - 1000 = 0$. What are the absolute error, the relative error, and the residual error?

3: Pi, see! The following routine estimates π by recursively computing the semiperimeter of a sequence of 2^{k+1}-gons embedded in the unit circle:

```
N = 4;
L(1) = sqrt(2);
s(1) = N*L(1)/2;
for k = 1:30
  N = N*2;
  L(k+1) = sqrt( 2*(1-sqrt(1-L(k)^2/4)) );
  s(k+1) = N*L(k+1)/2;
end

semilogy(1:length(s), abs(s-pi));
ylabel('|s_k-\pi|');
xlabel('k')
```

Plot the absolute error $|s_k - \pi|$ against k on a semilog plot. Explain why the algorithm behaves as it does, and describe a reformulation of the algorithm that does not suffer from this problem.