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Prelab 4
APPM4600

New subroutine:

```python
import numpy as np

def fixedpt(f,x0,tol,Nmax):

    x = np.zeros((Nmax, 1))

    count = 0
    while (count < Nmax):
        x1 = f(x0)
        if (abs(x1-x0) < tol):
            xstar = x1
            ier = 0
            a = count
        x0 = x1
        x[count] = x1
        count += 1

    xstar = x1
    ier = 1
    return (x, a)

f = lambda x: (10/(x+4))**(1/2)
tol = 10**-10
Nmax = 100

x0 = 1.5
(x, a) = fixedpt(f, x0, tol, Nmax)
print(a)
```

* x is vector of approximations
  a is number of iterations to converge with tol

1) $$\lim_{n\to\infty} \frac{|\hat{p}_{n+1} - p|}{|\hat{p}_n - p|^\alpha} = \lambda$$

$$\frac{|\hat{p}_{n+1} - p|}{\lambda} = |p_n - p|^\alpha$$

$$\lim_{n\to\infty} \log_{|\hat{p}_n - p|}\left(\frac{|\hat{p}_{n+1} - p|}{\lambda}\right) = \alpha$$

2a) 11 (from new subroutine)

2b) $$\log_{|p_{11} - p|}\left(\frac{|p_{12} - p|}{\lambda}\right) = \alpha$$

$\alpha = 1$, $\lambda < 1$ (linear convergence)