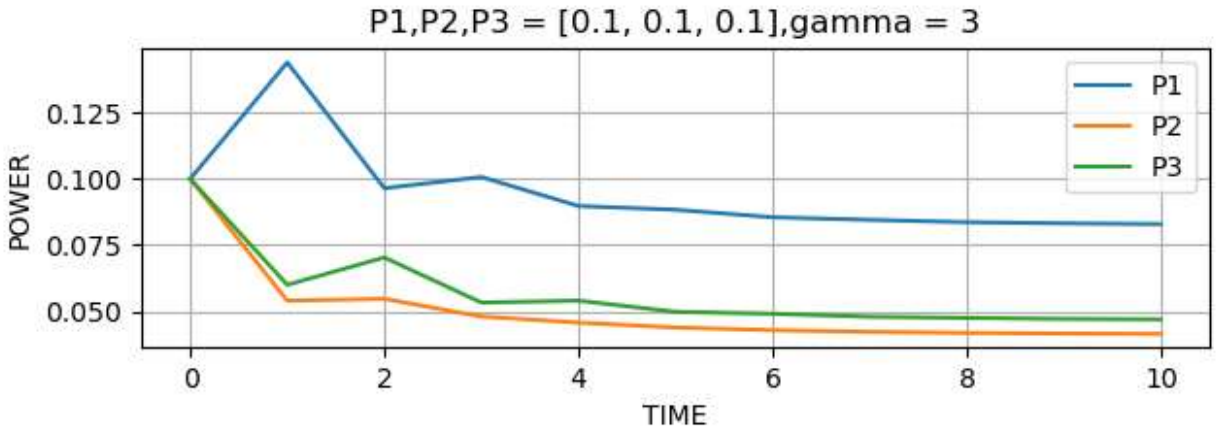
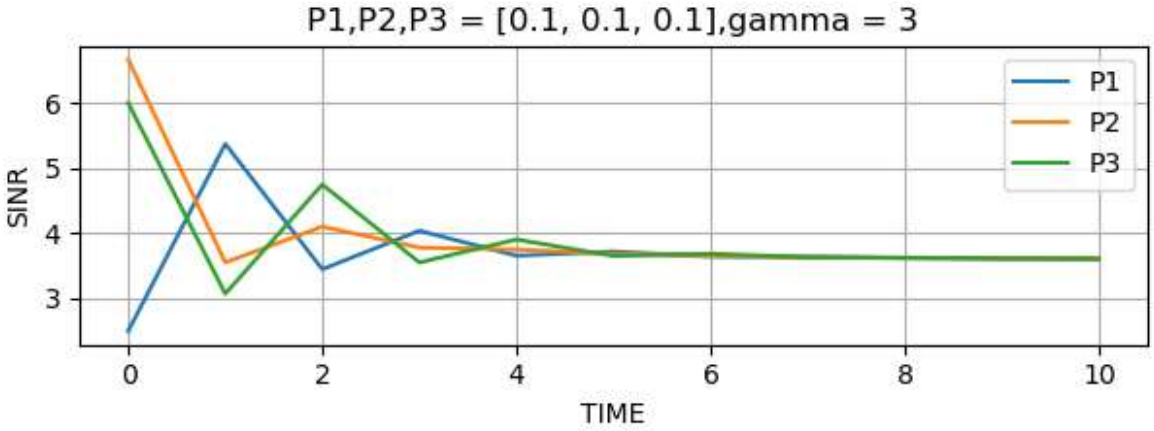
In [34]:
```
import numpy as np
import matplotlib.pyplot as plt
G = np.array([[1, 0.2, 0.1], [0.1, 2, 0.1], [0.3, 0.1, 3]])
gamma = 3
alpha = 1.2
sigma = 0.01

A = np.zeros((3, 3))
for i in range(3):
    for j in range(3):
        if i != j:
            A[i, j] = alpha * gamma * G[i, j] / G[i, i]

B = np.zeros(3)
for i in range(3):
    b[i] = alpha * gamma * sigma / G[i, i]


K = 10
p_i = np.array([0.1, 0.1, 0.1])
S = [G[0, 0]*p_i[0] / (sigma + G[0, 1]*p_i[1] + G[0, 2]*p_i[2]),
     G[1, 1]*p_i[1] / (sigma + G[1, 0]*p_i[0] + G[1, 2]*p_i[2]),
     G[2, 2]*p_i[2] / (sigma + G[2, 0]*p_i[0] + G[2, 1]*p_i[1])]

S = np.array(S).reshape((-1, 1))
p = p_i.reshape((-1, 1))

for _ in range(K):
    p_i = A.dot(p_i) + b
    p = np.hstack((p, p_i.reshape((-1, 1))))

    SINR_current = [G[0, 0]*p_i[0] / (sigma + G[0, 1]*p_i[1] + G[0, 2]*p_i[2]),
                    G[1, 1]*p_i[1] / (sigma + G[1, 0]*p_i[0] + G[1, 2]*p_i[2]),
                    G[2, 2]*p_i[2] / (sigma + G[2, 0]*p_i[0] + G[2, 1]*p_i[1])]
    S = np.hstack((S, np.array(SINR_current).reshape((-1, 1))))

temp = np.arange(K + 1)
plt.figure(1)
plt.subplot(2, 1, 1)
plt.plot(temp, p[0, :], '-', label='P1')
plt.plot(temp, p[1, :], '-', label='P2')
plt.plot(temp, p[2, :], '-', label='P3')
plt.xlabel('TIME')
plt.ylabel('POWER')
plt.title(r'P1,P2,P3 = [0.1, 0.1, 0.1],gamma = 3')
plt.legend()
plt.grid(True)

plt.subplot(2, 1, 2)
plt.plot(temp, S[0, :], '-', label='P1')
plt.plot(temp, S[1, :], '-', label='P2')
plt.plot(temp, S[2, :], '-', label='P3')
plt.xlabel('TIME')
plt.ylabel('SINR')
plt.title(r'P1,P2,P3 = [0.1, 0.1, 0.1],gamma = 3')
plt.legend()
plt.grid(True)
```

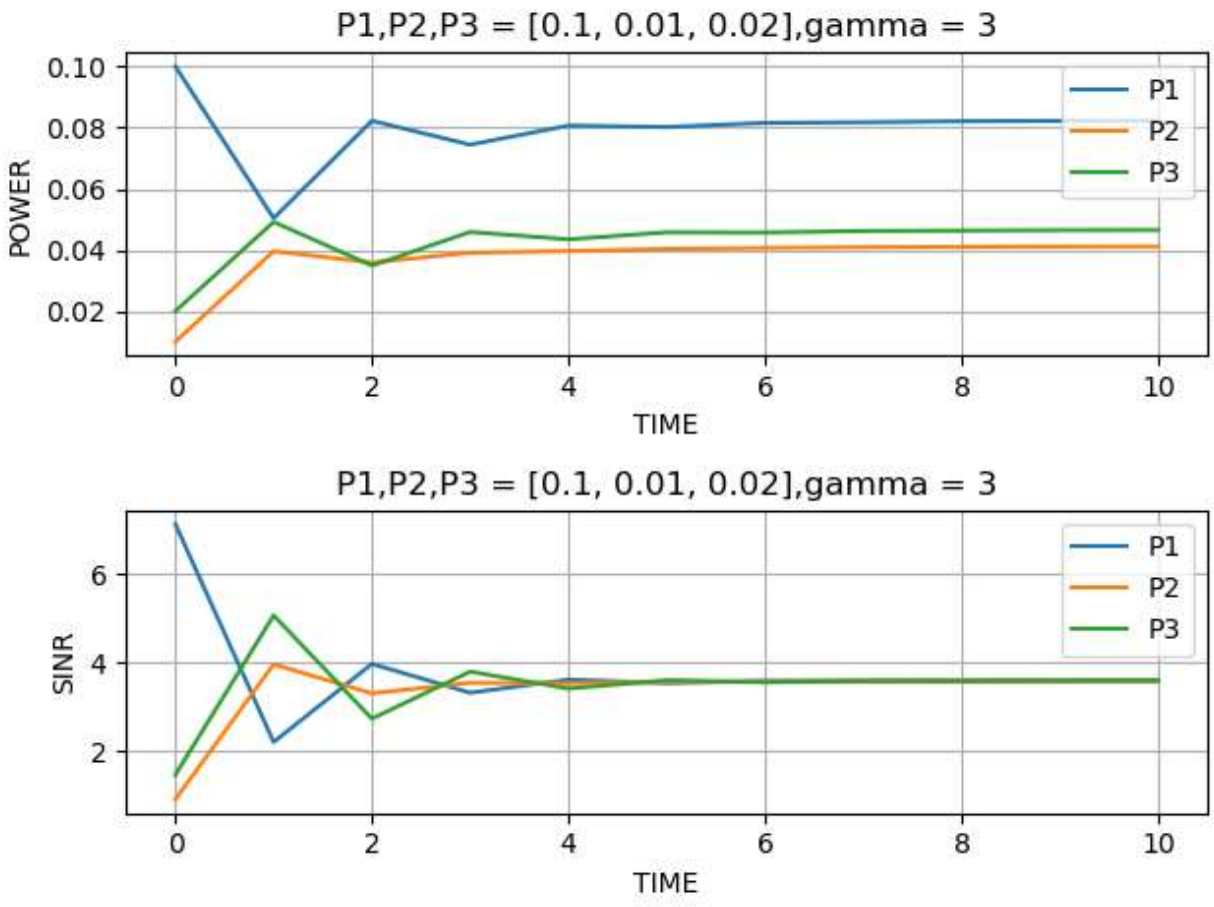
```
plt.tight_layout()
plt.show()
```





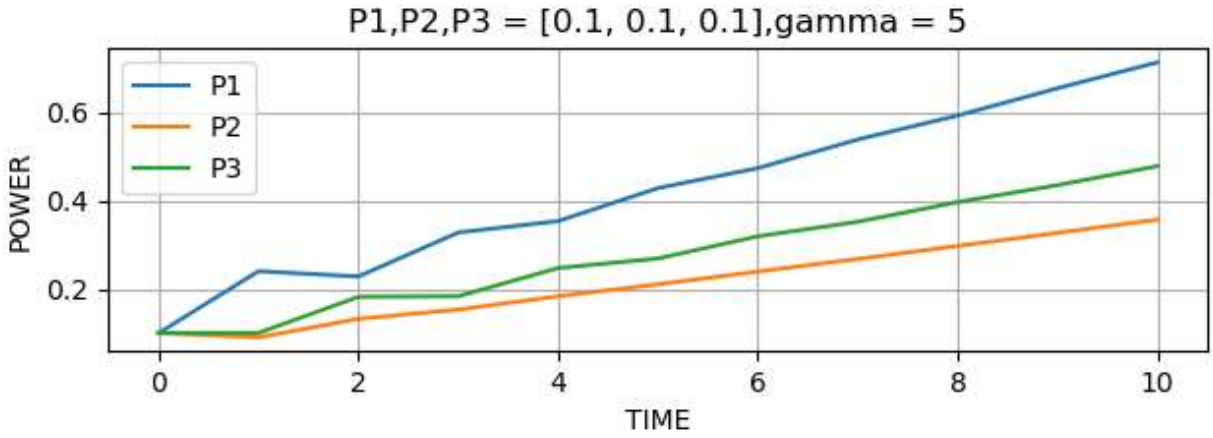
In [36]:
```
G = np.array([[1, 0.2, 0.1], [0.1, 2, 0.1], [0.3, 0.1, 3]])
gamma = 3
alpha = 1.2
sigma = 0.01

A = np.zeros((3, 3))
for i in range(3):
    for j in range(3):
        if i != j:
            A[i, j] = alpha * gamma * G[i, j] / G[i, i]

B = np.zeros(3)
for i in range(3):
    b[i] = alpha * gamma * sigma / G[i, i]

K = 10
p_i = np.array([0.1, 0.01, 0.02])
S = [G[0, 0]*p_i[0] / (sigma + G[0, 1]*p_i[1] + G[0, 2]*p_i[2]),
     G[1, 1]*p_i[1] / (sigma + G[1, 0]*p_i[0] + G[1, 2]*p_i[2]),
     G[2, 2]*p_i[2] / (sigma + G[2, 0]*p_i[0] + G[2, 1]*p_i[1])]

S = np.array(S).reshape((-1, 1))
p = p_i.reshape((-1, 1))

for _ in range(K):
    p_i = A.dot(p_i) + b
    p = np.hstack((p, p_i.reshape((-1, 1))))
```

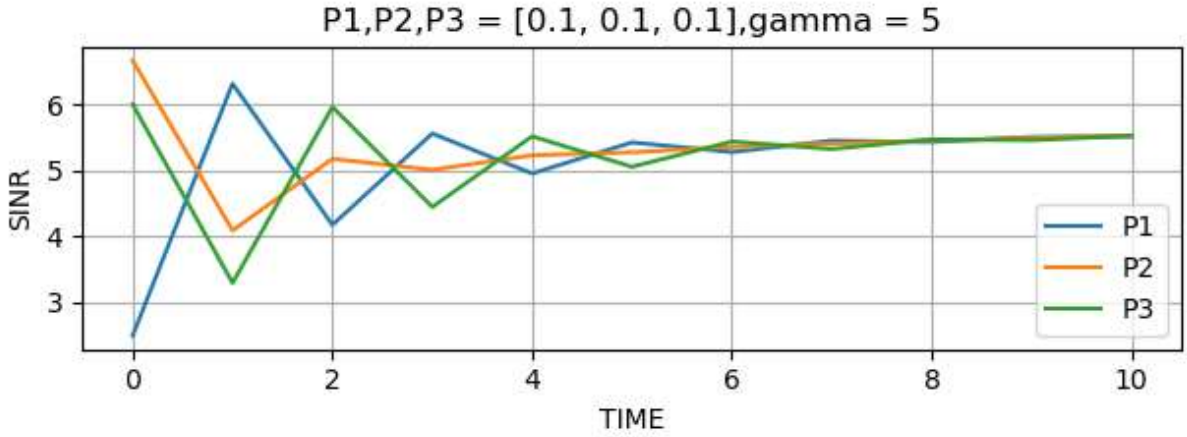
```
    SINR_current = [G[0, 0]*p_i[0] / (sigma + G[0, 1]*p_i[1] + G[0, 2]*p_i[2]),
                    G[1, 1]*p_i[1] / (sigma + G[1, 0]*p_i[0] + G[1, 2]*p_i[2]),
                    G[2, 2]*p_i[2] / (sigma + G[2, 0]*p_i[0] + G[2, 1]*p_i[1])]
    S = np.hstack((S, np.array(SINR_current).reshape((-1, 1))))

temp = np.arange(K + 1)
plt.figure(1)
plt.subplot(2, 1, 1)
plt.plot(temp, p[0, :], '-', label='P1')
plt.plot(temp, p[1, :], '-', label='P2')
plt.plot(temp, p[2, :], '-', label='P3')
plt.xlabel('TIME')
plt.ylabel('POWER')
plt.title(r'P1,P2,P3 = [0.1, 0.01, 0.02],gamma = 3')
plt.legend()
plt.grid(True)

plt.subplot(2, 1, 2)
plt.plot(temp, S[0, :], '-', label='P1')
plt.plot(temp, S[1, :], '-', label='P2')
plt.plot(temp, S[2, :], '-', label='P3')
plt.xlabel('TIME')
plt.ylabel('SINR')
plt.title(r'P1,P2,P3 = [0.1, 0.01, 0.02],gamma = 3')
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```



In [38]:
```
G = np.array([[1, 0.2, 0.1], [0.1, 2, 0.1], [0.3, 0.1, 3]])
gamma = 5
```

```
alpha = 1.2
sigma = 0.01

A = np.zeros((3, 3))
for i in range(3):
    for j in range(3):
        if i != j:
            A[i, j] = alpha * gamma * G[i, j] / G[i, i]

B = np.zeros(3)
for i in range(3):
    b[i] = alpha * gamma * sigma / G[i, i]


K = 10
p_i = np.array([0.1, 0.1, 0.1])
S = [G[0, 0]*p_i[0] / (sigma + G[0, 1]*p_i[1] + G[0, 2]*p_i[2]),
     G[1, 1]*p_i[1] / (sigma + G[1, 0]*p_i[0] + G[1, 2]*p_i[2]),
     G[2, 2]*p_i[2] / (sigma + G[2, 0]*p_i[0] + G[2, 1]*p_i[1])]

S = np.array(S).reshape((-1, 1))
p = p_i.reshape((-1, 1))

for _ in range(K):
    p_i = A.dot(p_i) + b
    p = np.hstack((p, p_i.reshape((-1, 1))))

    SINR_current = [G[0, 0]*p_i[0] / (sigma + G[0, 1]*p_i[1] + G[0, 2]*p_i[2]),
                    G[1, 1]*p_i[1] / (sigma + G[1, 0]*p_i[0] + G[1, 2]*p_i[2]),
                    G[2, 2]*p_i[2] / (sigma + G[2, 0]*p_i[0] + G[2, 1]*p_i[1])]
    S = np.hstack((S, np.array(SINR_current).reshape((-1, 1))))

temp = np.arange(K + 1)
plt.figure(1)
plt.subplot(2, 1, 1)
plt.plot(temp, p[0, :], '-', label='P1')
plt.plot(temp, p[1, :], '-', label='P2')
plt.plot(temp, p[2, :], '-', label='P3')
plt.xlabel('TIME')
plt.ylabel('POWER')
plt.title(r'P1,P2,P3 = [0.1, 0.1, 0.1],gamma = 5')
plt.legend()
plt.grid(True)

plt.subplot(2, 1, 2)
plt.plot(temp, S[0, :], '-', label='P1')
plt.plot(temp, S[1, :], '-', label='P2')
plt.plot(temp, S[2, :], '-', label='P3')
plt.xlabel('TIME')
plt.ylabel('SINR')
plt.title(r'P1,P2,P3 = [0.1, 0.1, 0.1],gamma = 5')
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```





In [39]:
```
G = np.array([[1, 0.2, 0.1], [0.1, 2, 0.1], [0.3, 0.1, 3]])
gamma = 5
alpha = 1.2
sigma = 0.01

A = np.zeros((3, 3))
for i in range(3):
    for j in range(3):
        if i != j:
            A[i, j] = alpha * gamma * G[i, j] / G[i, i]

B = np.zeros(3)
for i in range(3):
    b[i] = alpha * gamma * sigma / G[i, i]

K = 10
p_i = np.array([0.1, 0.01, 0.02])
S = [G[0, 0]*p_i[0] / (sigma + G[0, 1]*p_i[1] + G[0, 2]*p_i[2]),
     G[1, 1]*p_i[1] / (sigma + G[1, 0]*p_i[0] + G[1, 2]*p_i[2]),
     G[2, 2]*p_i[2] / (sigma + G[2, 0]*p_i[0] + G[2, 1]*p_i[1])]

S = np.array(S).reshape((-1, 1))
p = p_i.reshape((-1, 1))

for _ in range(K):
    p_i = A.dot(p_i) + b
    p = np.hstack((p, p_i.reshape((-1, 1))))

    SINR_current = [G[0, 0]*p_i[0] / (sigma + G[0, 1]*p_i[1] + G[0, 2]*p_i[2]),
                    G[1, 1]*p_i[1] / (sigma + G[1, 0]*p_i[0] + G[1, 2]*p_i[2]),
```

```
                    G[2, 2]*p_i[2] / (sigma + G[2, 0]*p_i[0] + G[2, 1]*p_i[1])]
    S = np.hstack((S, np.array(SINR_current).reshape((-1, 1))))

temp = np.arange(K + 1)
plt.figure(1)
plt.subplot(2, 1, 1)
plt.plot(temp, p[0, :], '-', label='P1')
plt.plot(temp, p[1, :], '-', label='P2')
plt.plot(temp, p[2, :], '-', label='P3')
plt.xlabel('TIME')
plt.ylabel('POWER')
plt.title(r'P1,P2,P3 = [0.1, 0.01, 0.02],gamma = 5')
plt.legend()
plt.grid(True)

plt.subplot(2, 1, 2)
plt.plot(temp, S[0, :], '-', label='P1')
plt.plot(temp, S[1, :], '-', label='P2')
plt.plot(temp, S[2, :], '-', label='P3')
plt.xlabel('TIME')
plt.ylabel('SINR')
plt.title(r'P1,P2,P3 = [0.1, 0.01, 0.02],gamma = 5')
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```