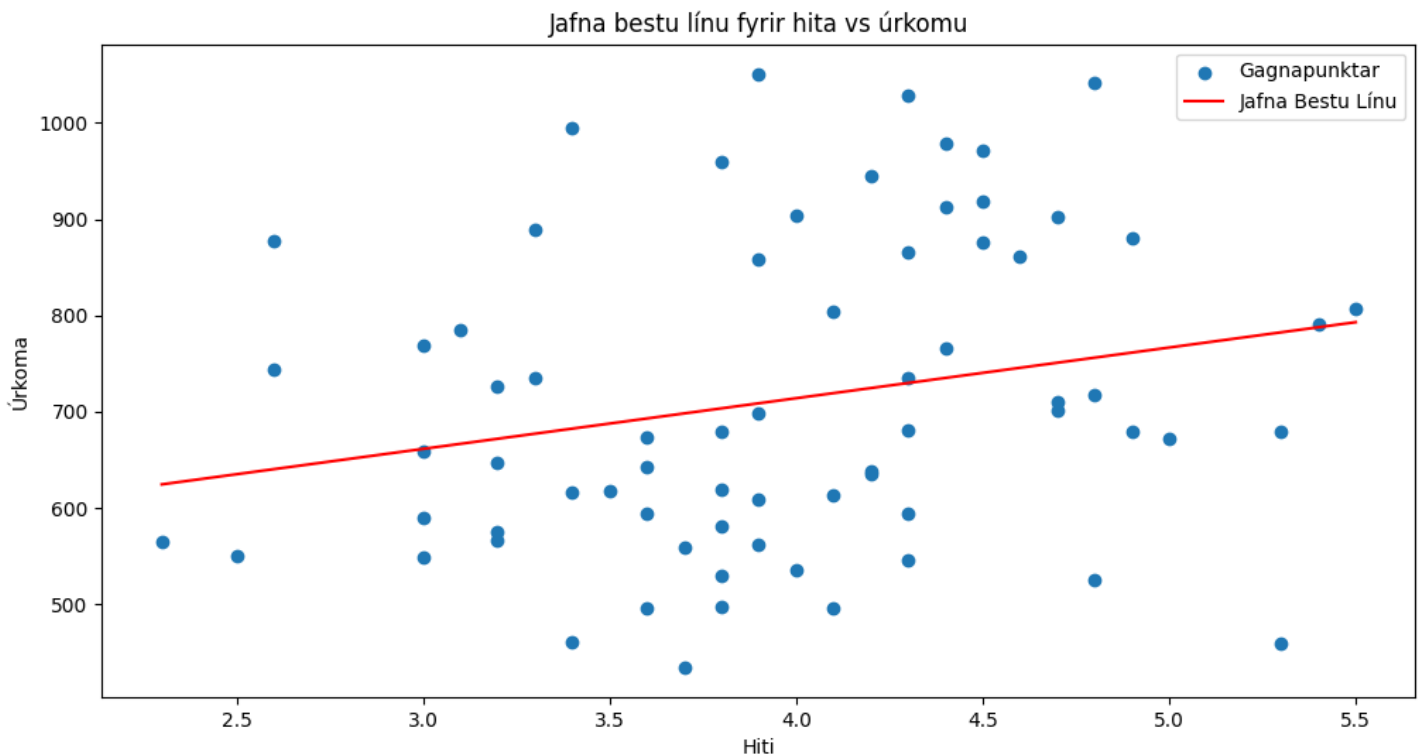


Hér er liður 1(Verkefni 25)

In [27]:

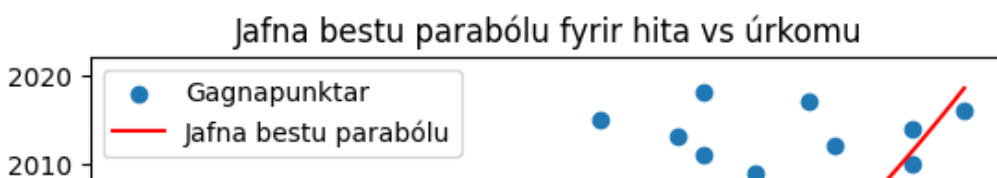
```
import numpy as np
import matplotlib.pyplot as plt
import math

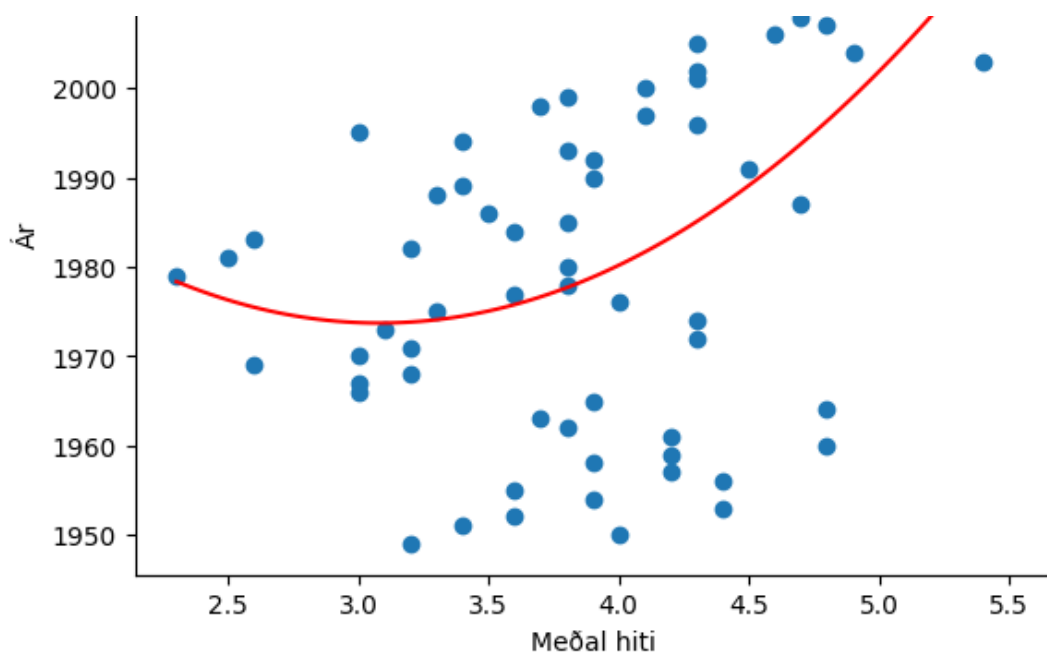
(ár, hiti, úrk) = np.loadtxt("https://cs.hi.is/python/hiti-urkoma.txt").T
(a, b) = np.polyfit(hiti, úrk, deg=1)
plt.figure(figsize=(12, 6))
plt.scatter(hiti, úrk, label='Gagnapunktur')
xp = np.linspace(hiti.min(), hiti.max())
yp = a*xp + b
plt.plot(xp, yp, 'r', label='Jafna Bestu Línu')
plt.xlabel('Hiti')
plt.ylabel('Úrkoma')
plt.title('Jafna bestu línu fyrir hita vs úrkomu')
plt.legend()
plt.show()
```



In [21]:

```
(c, d, e) = np.polyfit(hiti, ár, deg=2)
plt.scatter(hiti, ár, label='Gagnapunktur')
xp2 = np.linspace(hiti.min(), hiti.max(), 100)
yp2 = c*xp2**2 + d*xp2 + e
plt.plot(xp2, yp2, 'r', label='Jafna bestu parabólu')
plt.xlabel('Meðal hiti')
plt.ylabel('Ár')
plt.title('Jafna bestu parabólu fyrir hita vs úrkomu')
plt.legend()
plt.show()
```





Hér er liður 2(Verkefni 30)

In [22]:

```
## BYRJA
import matplotlib.pyplot as plt, numpy as np
from math import nan
plt.rc('axes', axisbelow=True)

def teikna_fylki(A):
    # Teiknar 2 x n flatarmyndarfylki
    plt.plot(A[0],A[1], lw=3, color='k')

def hliðra(A, h):
    # Leggur h við alla dálka A
    return A + np.reshape(h, (2,1))
```

1. Flatarmynd lýst með 2xn fylki

Búum til fylkið

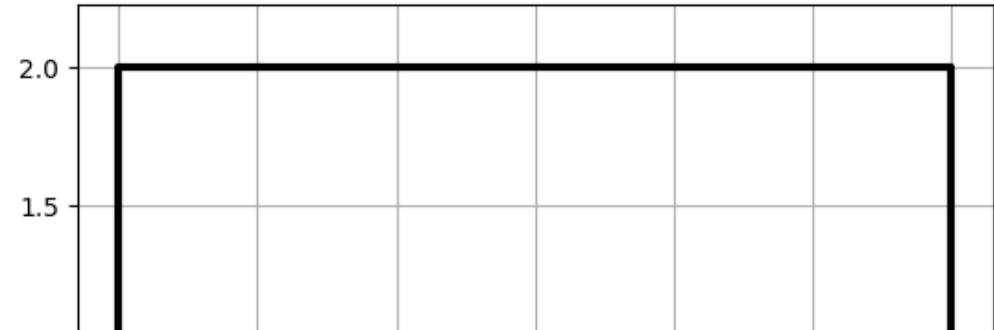
$$M = \begin{pmatrix} 0 & 3 & 3 & 0 & 0 & \text{nan} & 1 & 2 \\ 0 & 0 & 2 & 2 & 0 & \text{nan} & 1 & 1 \end{pmatrix}$$

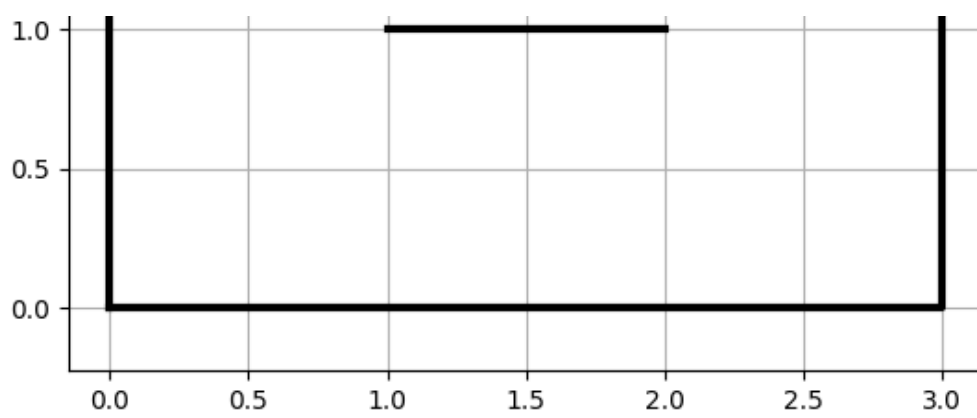
In [29]:

```
M = np.array([[0, 3, 3, 0, 0, np.nan, 1, 2],
              [0, 0, 2, 2, 0, np.nan, 1, 1]])

teikna_fylki(M)
theta = math.radians(30)

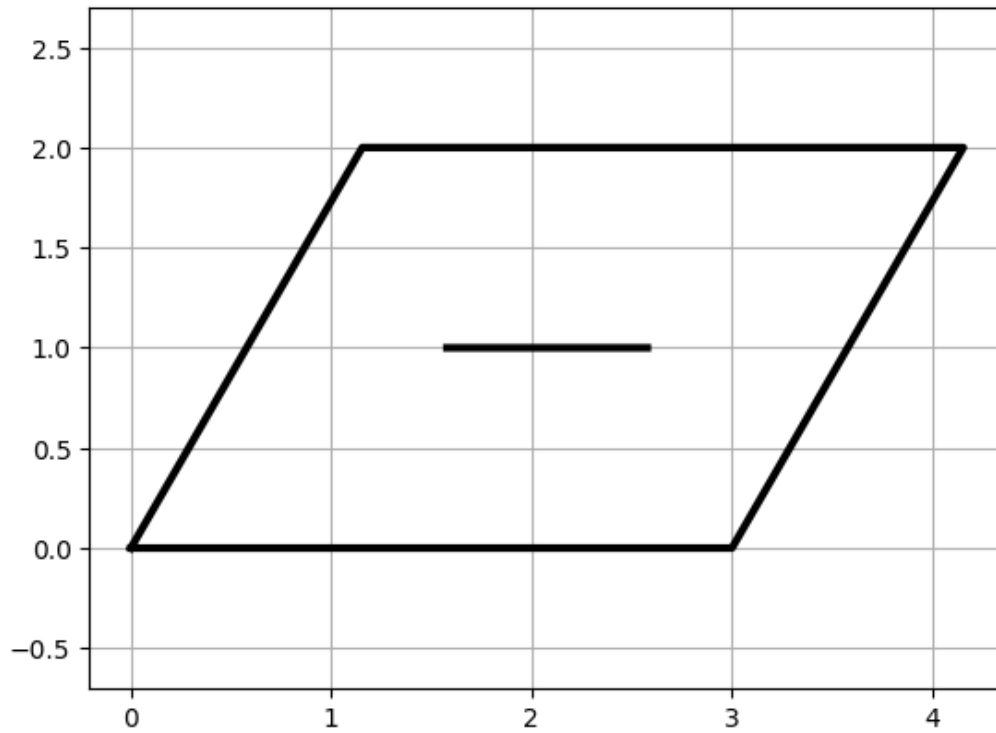
S = [[1, math.tan(theta)], [0, 1]]
M_skekkt = np.dot(S, M)
```





In [30]:

```
teikna_fylki(Skakkt)
```



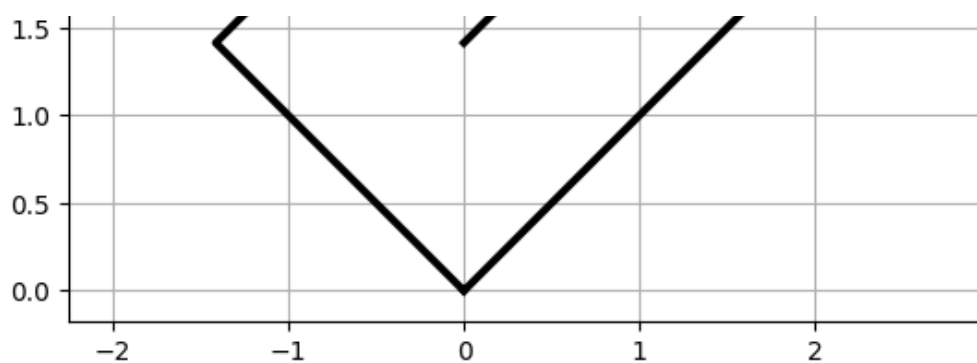
1. Snúningsfylki

In [34]:

```
def Snuningur(angle):
    theta = np.radians(angle)
    R = np.array([[np.cos(theta), -np.sin(theta)],
                  [np.sin(theta), np.cos(theta)]])
    return R
```

```
R = Snuningur(45)
Snuid = np.dot(R, M)
teikna_fylki(Snuid)
```



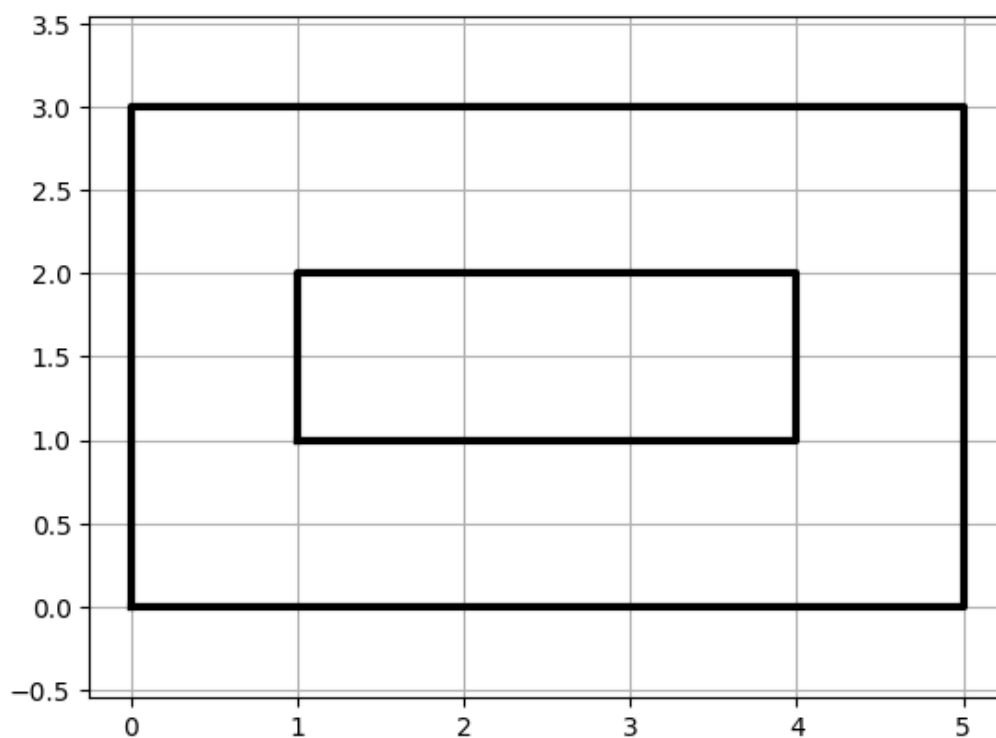


1. Sammiðja rétthyrningar

In [36]:

```
StoriKassi = np.array([[0, 5, 5, 0, 0],
                       [0, 0, 3, 3, 0]])
LitliKassi = np.array([[1, 4, 4, 1, 1],
                       [1, 1, 2, 2, 1]])

Stakkaðir = np.hstack((StoriKassi, np.array([[np.nan], [np.nan]]), LitliKassi))
teikna_fylki(Stakkaðir)
```



1. Þríhyrningur með hæð

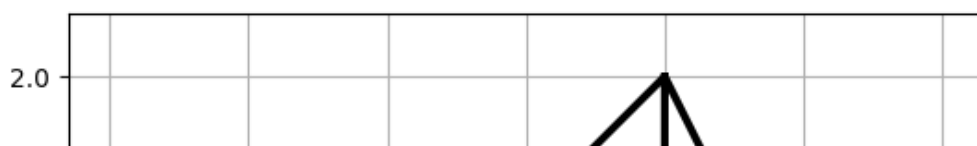
In [39]:

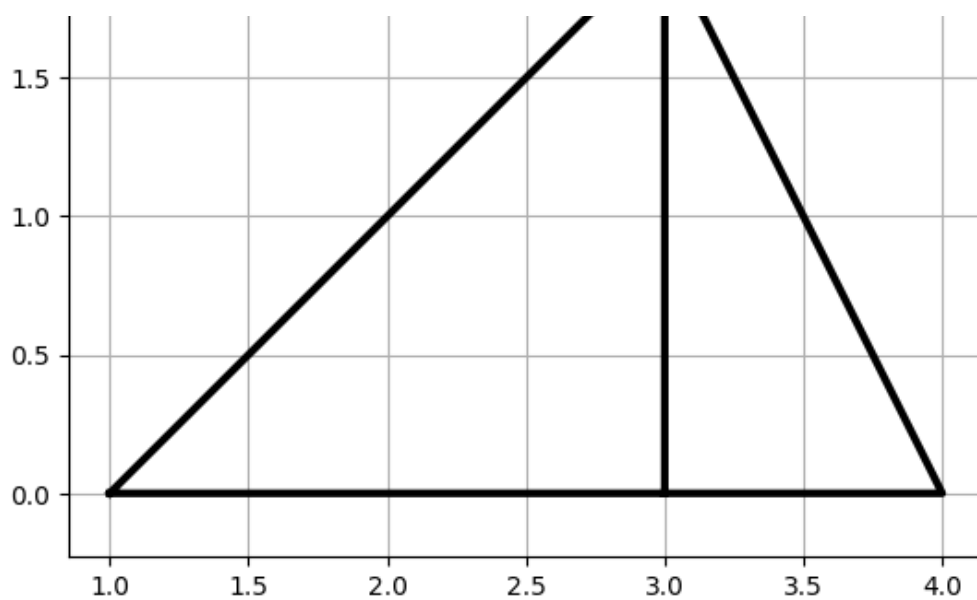
```
thrihyrningur = np.array([[1, 3, 4, 1], #x-hnit í A, B, C og aftur í A
                          [0, 2, 0, 0]]) #y-hnit A, B, C og aftur í A

strik = np.array([[3, 3], #x-hnit
                  [2, 0]]) #y-hnit

T = np.hstack((thrihyrningur, np.array([[np.nan], [np.nan]]), strik))

teikna_fylki(T)
```





1. Hliðra-snúa-hliðra

In [44]:

```
def snua_kringum_punkt(form, horn, punktur):
    faerdur = hliðra(form, -np.array(punktur))

    R = Snuningur(horn)
    umsnuningur = np.dot(R, faerdur)

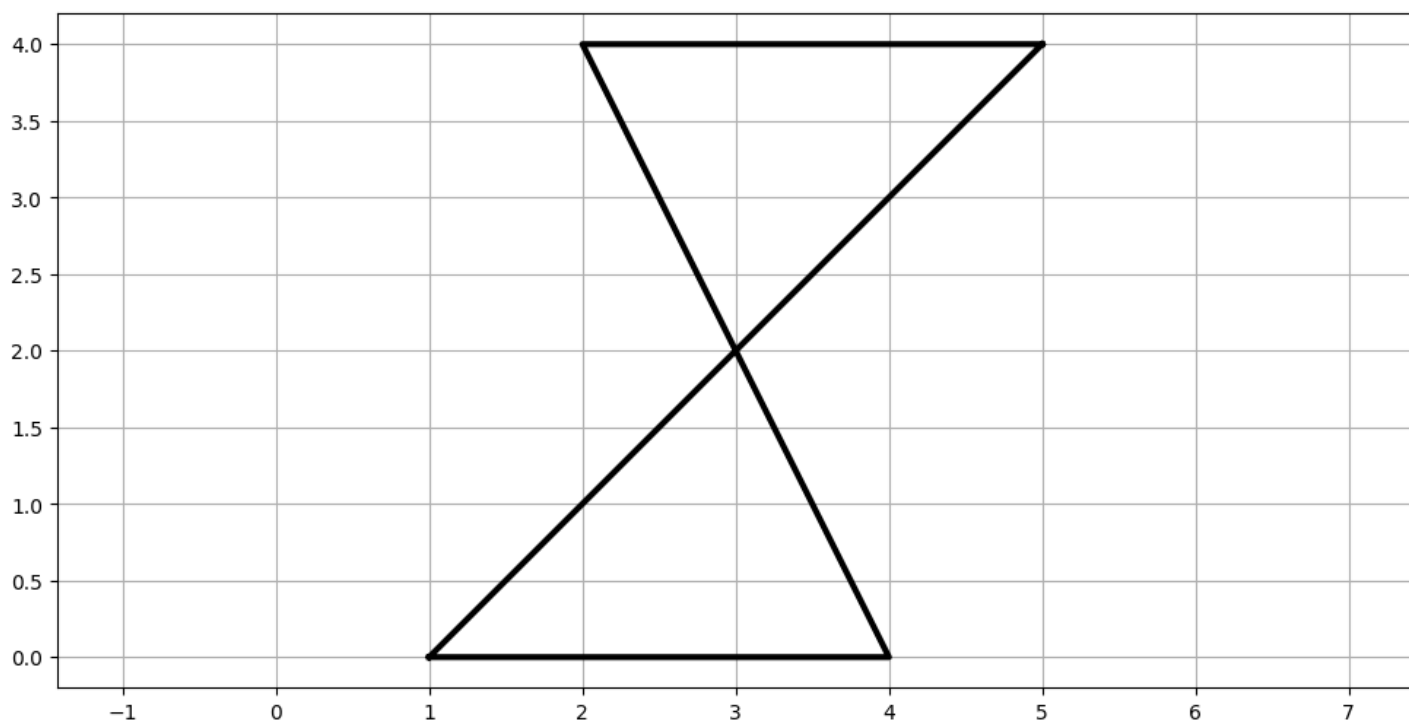
    faerdur_aftur = hliðra(umsnuningur, np.array(punktur))
    return faerdur_aftur

T = np.array([[1, 3, 4, 1],
              [0, 2, 0, 0]])

B_punktur = [3, 2]

T_snuinn = snua_kringum_punkt(T, 180, B_punktur)

plt.figure(figsize=(12, 6))
teikna_fylki(T) # Upphaflegi þríhyrningurinn
teikna_fylki(T_snuinn) #þríhyrningurinn eftir snúning
```



1. Snúa-spegla-snúa

