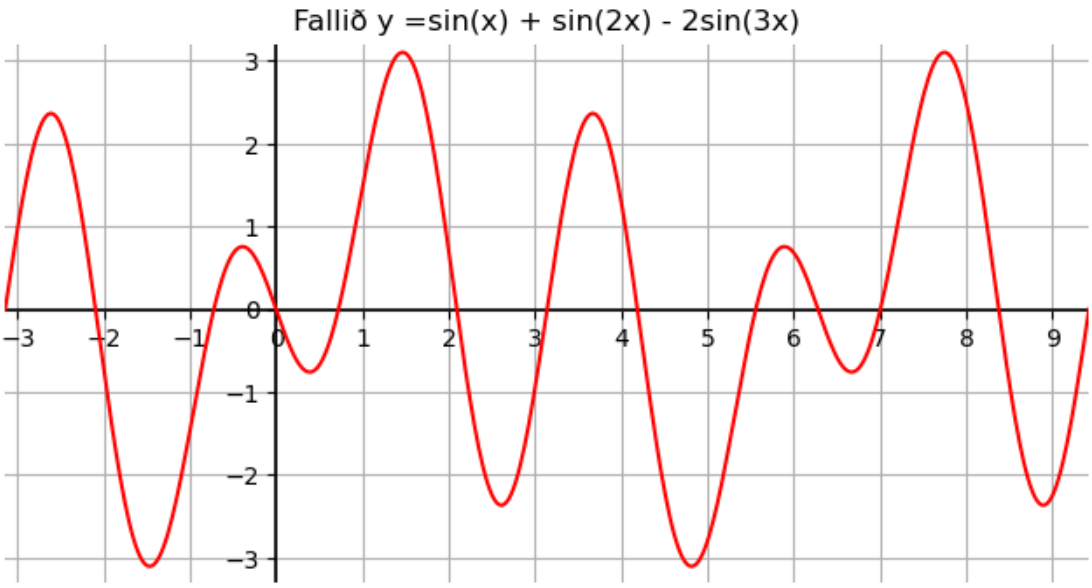
S6

February 19, 2023

0.1 22. Sínussveiflur

[228]:
```
from math import sin, pi
import matplotlib.pyplot as plt
import numpy as np
from scipy import interpolate
def f(x):
    return sin(x) +  sin(2*x)-2*sin(3*x)
fig = plt.figure(figsize=(8,4))
ax = fig.add_subplot(1, 1, 1)
ax.spines['left'].set_position('zero')
ax.spines['bottom'].set_position('zero')
plt.xlim([-pi, 3*pi])
plt.ylim([-3.3, 3.2])
plt.xticks(np.arange(-3,10,1))
plt.yticks(np.arange(-3,3.1,1))
plt.axvline(lw=1.2, c='k')
plt.axhline(lw=1.2, c='k')
plt.grid(True)
plt.box(False)
x=np.linspace(-pi,3*pi,500)
y=[f(xi) for xi in x]
bspline = interpolate.make_interp_spline(x, y)
y_new = bspline(x)
plt.title("Fallið y =sin(x) + sin(2x) - 2sin(3x)")

plt.plot(x,y, c='r')

plt.show()
```



0.2 23. Málmavinnsla

0.2.1 1.

[149]:
```
def number(k):
    if k%2==0:
        return int((((k+1)*(k+2)*(k+3))/6)+(k/2)-1)
    else:
        return int((((k+1)*(k+2)*(k+3))/6)-2)
a = [number(i) for i in range(1,8)]

print("k          Noble gas")
for i in range(1,8):
    print(f"{i:<10} {number(i)}")
```

```
k          Noble gas
1          2
2          10
3          18
4          36
5          54
6          86
7          118
```

0.2.2 2.

[186]:
```
def lota(s):
    if s>118:
        raise ValueError("Last element on the periodic table is Oganesson with␣
 ↪the element number 118.")
    i = 1
    while s>a[i]:
        i+=1
    return i



def flokkur(y):
    if y == 1:
        return 1
    elif 1<y and y<=(a[lota(y)-1]+2):
        return y-a[lota(y)]
    else:
        return max(3,18+y-a[lota(y)])


flokkur(58)
```

[186]: 3

0.2.3 3.

[313]:
```
def íslenska(s):
    """notað sem 'key' í sort eða sorted til að raða í íslenska stafrófsröð,
    t.d. print(sorted(['ár','bára','bali','akur'], key=íslenska))"""
    return [íslenska.k.get(c.lower(),0) for c in s]
íslenska.a = list('0123456789aábcdðeéfghiíjklmnoópqrstuúvwxyýzþæö')
íslenska.k = dict(zip(íslenska.a, range(1,len(íslenska.a)+1)))


file = "https://cs.hi.is/python/allir-malmar.txt"
(x,y,z,a,b,c) = np.loadtxt(file, dtype=str, delimiter=";", skiprows=1).T

Edlisthyng = np.char.replace(a, ',', '.')
Edlisthyngd = Edlisthyng.astype(float)
Takn = x.astype(str)
Malmur = y.astype(str)
Saetistala = z.astype(int)
Braedslumark = b.astype(int)
Enska = c.astype(str)
```

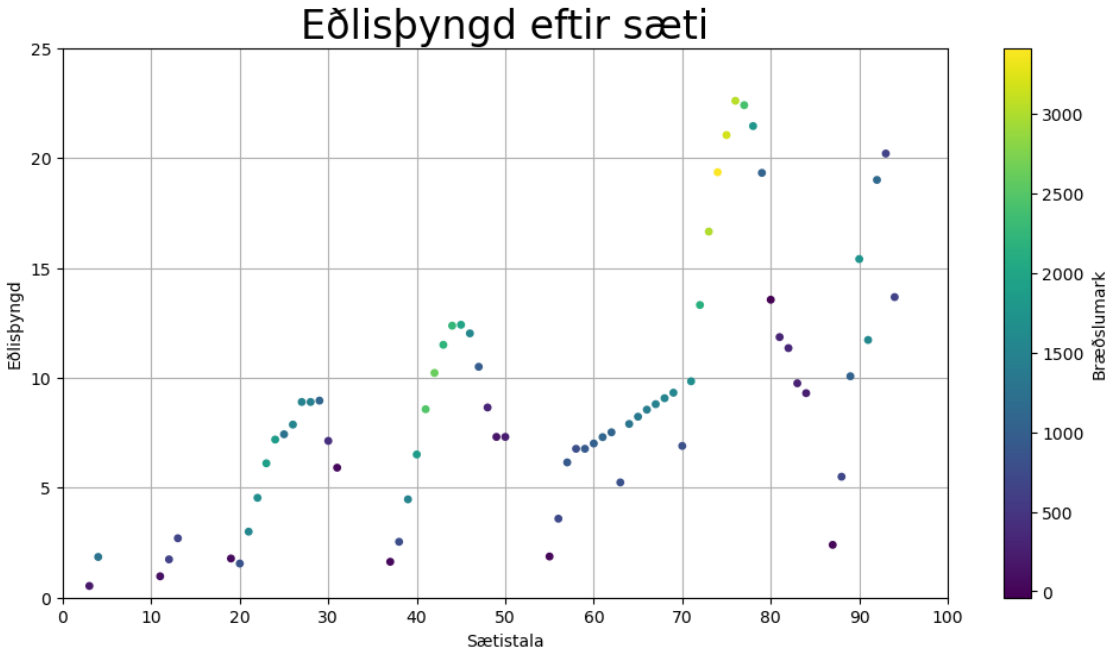
```
SortedList = sorted(Dictionary,key=íslenska)
SortedDict = {i: Dictionary[i] for i in SortedList}

print("Íslenska      Enska")
for i in SortedDict:
    print (i.capitalize().ljust(12), SortedDict[i])
```

```
{'aktín': 1050, 'ál': 660, 'barín': 725, 'beryllín': 1278, 'bismút': 271, 'blý':
327, 'dysprósín': 1412, 'erbín': 1522, 'evrópín': 822, 'fransín': 20, 'gadólín':
1311, 'gallín': 30, 'gull': 1064, 'hafnín': 2150, 'hólmín': 1470, 'indín': 157,
'iridín': 2410, 'járn': 1535, 'kadmín': 321, 'kalín': 64, 'kalsín': 839,
'kopar': 1083, 'kóbalt': 1495, 'króm': 1857, 'kvikasilfur': -39, 'lantan': 920,
'litín': 180, 'lútetín': 1656, 'magnesín': 639, 'mangan': 1245, 'mólýbden':
2617, 'natrín': 98, 'neódým': 1010, 'neptún': 640, 'nikkel': 1453, 'níóbín':
2468, 'osmín': 3045, 'palladín': 1552, 'platína': 1772, 'plúton': 640, 'pólon':
254, 'praseódým': 935, 'prometín': 1100, 'prótaktín': 1568, 'radín': 700,
'renín': 3180, 'ródín': 1966, 'rúbidín': 39, 'rúþen': 2250, 'samarín': 1072,
'serín': 795, 'sesín': 28, 'silfur': 962, 'sink': 420, 'sirkon': 1852,
'skandín': 1539, 'strontín': 769, 'tantal': 2996, 'teknetín': 2200, 'terbín':
1360, 'tin': 232, 'títan': 1660, 'túlín': 1545, 'úran': 1132, 'vanadín': 1890,
'volfram': 3410, 'ytterbín': 824, 'yttrín': 1523, 'þallín': 303, 'þórín': 1750}
Íslenska      Enska
Aktín         Actinium
Ál            Aluminum
Barín         Barium
Beryllín      Beryllium
Bismút        Bismuth
Blý           Lead
Dysprósín     Dysprosium
Erbín         Erbium
Evrópín       Europium
Fransín       Francium
Gadólín       Gadolinium
Gallín        Gallium
Gull          Gold
Hafnín        Hafnium
Hólmín        Holmium
Indín         Indium
Iridín        Iridium
Járn          Iron
Kadmín        Cadmium
Kalín         Potassium
Kalsín        Calcium
Kopar         Copper
Kóbalt        Cobalt
Króm          Chromium
Kvikasilfur   Mercury
```

Lantan	Lanthanum
Litín	Lithium
Lútetín	Lutetium
Magnesín	Magnesium
Mangan	Manganese
Mólýbden	Molybdenum
Natrín	Sodium
Neódým	Neodymium
Neptún	Neptunium
Nikkel	Nickel
Níóbín	Niobium
Osmín	Osmium
Palladín	Palladium
Platína	Platinum
Plúton	Plutonium
Pólon	Polonium
Praseódým	Praseodymium
Prometín	Promethium
Prótaktín	Protactinium
Radín	Radium
Renín	Rhenium
Ródín	Rhodium
Rúbidín	Rubidium
Rúþen	Ruthenium
Samarín	Samarium
Serín	Cerium
Sesín	Cesium
Silfur	Silver
Sink	Zinc
Sirkon	Zirconium
Skandín	Scandium
Strontín	Strontium
Tantal	Tantalum
Teknetín	Technetium
Terbín	Terbium
Tin	Tin
Títan	Titanium
Túlín	Thulium
Úran	Uranium
Vanadín	Vanadium
Volfram	Tungsten
Ytterbín	Ytterbium
Yttrín	Yttrium
Þallín	Thallium
Þórín	Thorium

0.2.4 4.

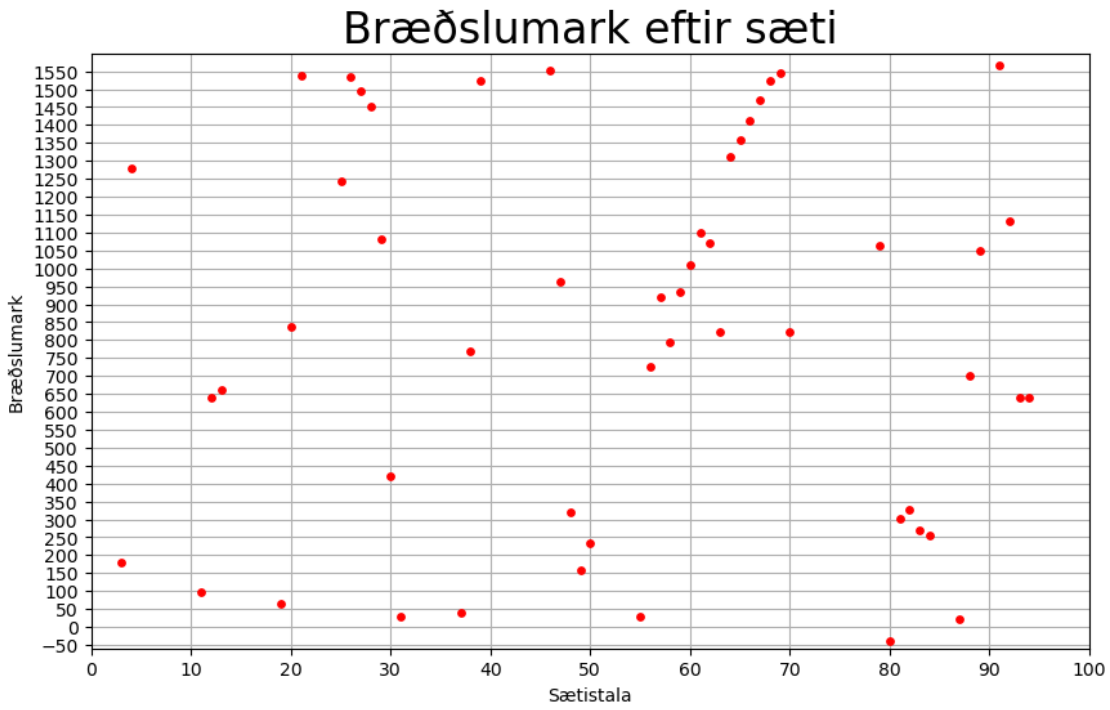
[288]:
```
import matplotlib.pyplot as plt
plt.figure(figsize=(12,6))
plt.grid(True)
plt.xlim(0,100)
plt.ylim(0,25)
plt.xticks(np.arange(0,101, 10))
plt.xlabel('Sætistala')
plt.ylabel('Eðlisþyngd')
plt.title("Eðlisþyngd eftir sæti", size=24)
plt.scatter(Saetistala, Edlisthyngd, c=Braedslumark, zorder=3, s=15)
plt.colorbar(label="Bræðslumark")
plt.show()
```



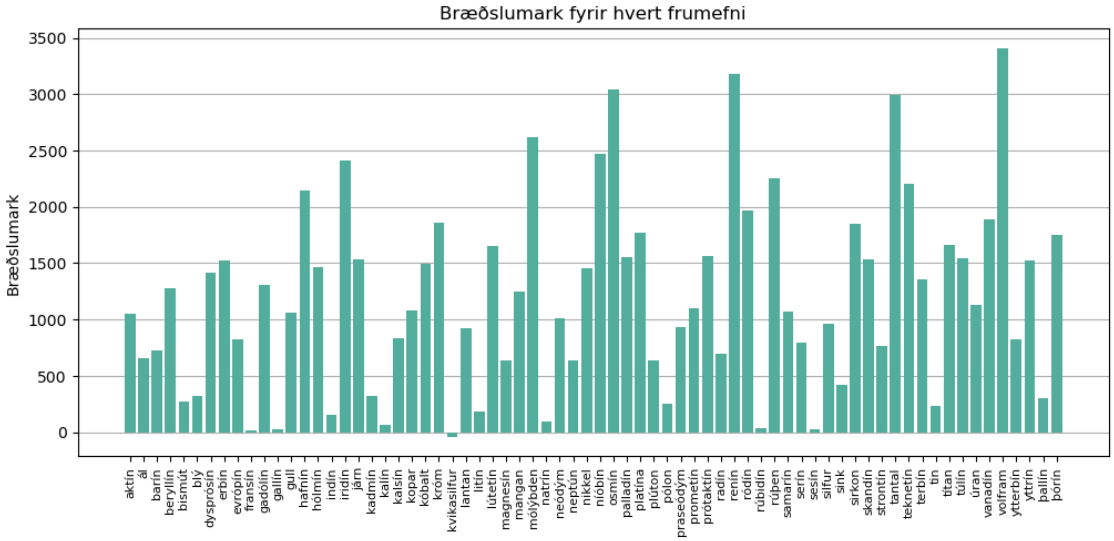
0.2.5 5.

[310]:
```
plt.figure(figsize=(10,6))
plt.grid(True)
plt.xlim(0,100)
plt.ylim(-60,1600)
plt.xticks(np.arange(0,101, 10))
plt.xlabel('Sætistala')
plt.ylabel('Bræðslumark')
plt.yticks(np.arange(-50, 1600, 50))
plt.title("Bræðslumark eftir sæti", size=24)
```

```
plt.scatter(Saetistala, Braedslumark, zorder=3, s=15, c="r")
plt.show()
```



[343]:
```
Dictionary = dict(zip(Malmur,Enska))
BraedsluNafn = dict(zip(Malmur, Braedslumark))

SortedList = sorted(BraedsluNafn, key=íslenska)
SortedDict = {i: BraedsluNafn[i] for i in SortedList}

plt.figure(figsize=(12,5))

plt.grid(True, axis='y')
plt.bar(SortedList, SortedDict.values(), color='#52ad9c', linewidth=0.6,␣
 ↪zorder=3)
plt.xticks(rotation=90, size=8)
plt.ylabel('Bræðslumark')
plt.title('Bræðslumark fyrir hvert frumefni')
plt.show()
```


Bræðslumark fyrir hvert frumefni
Bræðslumark
3500
3000
2500
2000
1500
1000
500
0
aktín
ál
barín
beryllín
bismút
blý
dýsprósín
erbín
evrópín
fransín
gadólín
gallín
gull
hafnín
hólmín
indín
iridín
járn
kadmín
kalín
kalsín
kopar
kóbalt
króm
kvikasilfur
lantan
litín
lútetín
magnesín
mangan
mólýbden
natrín
neódým
neptún
nikkel
níóbín
osmín
palladín
platína
plúton
pólon
praseódým
prómetín
protaktín
radín
renín
ródín
rúbidín
rúben
samarín
serín
sesín
silfur
sink
sirkon
skandín
strontín
tantal
teknetín
terbín
tin
títan
túlín
úran
vanadín
volfram
ytterbín
yttrín
þallín
þórín