s6

February 22, 2022

1 22 málmavinnsla

1.1 a)

[ ]:
```
def sk(k):
    out = ((k+1)*(k+2)*(k+3))//6
    if (k%2==0): out += (k//2)-1
    else: out += -2
    return out

print(sk(1))
print(sk(2))
print(sk(3))
print(sk(4))
print(sk(5))
print(sk(6))
print(sk(7))
```

```
2
10
18
36
54
86
118
```

1.2 b)

[ ]:
```
def lota(s):
    for i in range(2,8):
        if (s > sk(i-1) and s <= sk(i)): return i

def flokkur(s):
    k = lota(s)
    if (s == 1): return 1
    elif (s > 1 and s <= sk(k-1)+2): return s-sk(k-1)
    else: return max(3,18+s-sk(k))
```

```
print(lota(42))
print(flokkur(42))
print(lota(79))
print(flokkur(79))
print(lota(11))
print(flokkur(11))
print(lota(85))
print(flokkur(85))
```

```
5
6
6
11
3
1
6
17
```

1.3 c)

[ ]:
```
import numpy as np

f = "https://cs.hi.is/python/allir-malmar.txt"
all = np.loadtxt(f, skiprows=1, delimiter=';', dtype='str', encoding='UTF-8').T
eTakn    = all[0].tolist()
nafn        = all[1].tolist()
sTala   = all[2].astype(int)
A3          = np.char.replace(all[3], ",", ".")
eThyngd  = A3.astype(float)
bMark = all[4].astype(int)
eNafn  = all[5].tolist()

def islenska(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 [islenska.k.get(c.lower(),0) for c in s]

islenska.a = list('0123456789aábcdðeéfghiíjklmnoópqrstuúvwxyýzþæö')
islenska.k = dict(zip(islenska.a, range(1,len(islenska.a)+1)))

tafla = dict(zip(nafn,eNafn))
for (nafn, eNafn) in tafla.items():
    print(f'{nafn:13}{eNafn}')

radad = sorted(tafla,key=islenska)
alltradad = []
for i in radad:
```

```
    alltradad.append((i,tafla[i]))

print(alltradad)
```

```
litín         Lithium
beryllín      Beryllium
natrín        Sodium
magnesín      Magnesium
ál            Aluminum
kalín         Potassium
kalsín        Calcium
skandín       Scandium
títan         Titanium
vanadín       Vanadium
króm          Chromium
mangan        Manganese
járn          Iron
kóbalt        Cobalt
nikkel        Nickel
kopar         Copper
sink          Zinc
gallín        Gallium
rúbidín       Rubidium
strontín      Strontium
yttrín        Yttrium
sirkon        Zirconium
níóbín        Niobium
mólýbden      Molybdenum
teknetín      Technetium
rúþen         Ruthenium
ródín         Rhodium
palladín      Palladium
silfur        Silver
kadmín        Cadmium
indín         Indium
tin           Tin
sesín         Cesium
barín         Barium
lantan        Lanthanum
serín         Cerium
praseódým     Praseodymium
neódým        Neodymium
prometín      Promethium
samarín       Samarium
evrópín       Europium
gadólín       Gadolinium
terbín        Terbium
```

```
dysprósín    Dysprosium
hólmín       Holmium
erbín        Erbium
túlín        Thulium
ytterbín     Ytterbium
lútetín      Lutetium
hafnín       Hafnium
tantal       Tantalum
volfram      Tungsten
renín        Rhenium
osmín        Osmium
iridín       Iridium
platína      Platinum
gull         Gold
kvikasilfur  Mercury
þallín       Thallium
blý          Lead
bismút       Bismuth
pólon        Polonium
fransín      Francium
radín        Radium
aktín        Actinium
þórín        Thorium
prótaktín    Protactinium
úran         Uranium
neptún       Neptunium
plúton       Plutonium
[('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')]
```

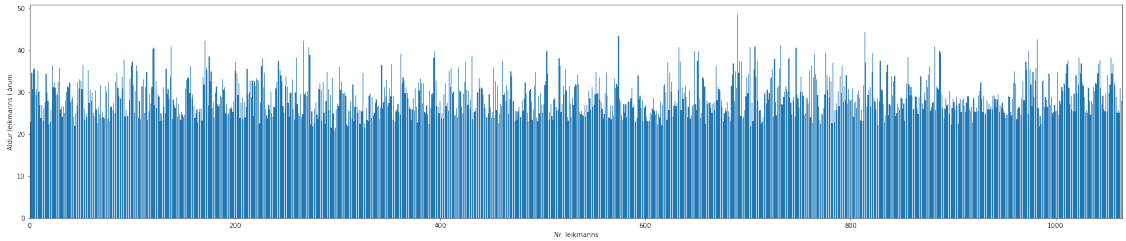
1.4 d)

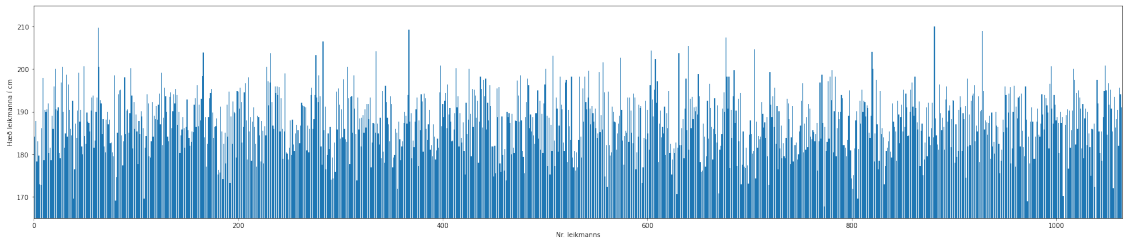
[ ]:

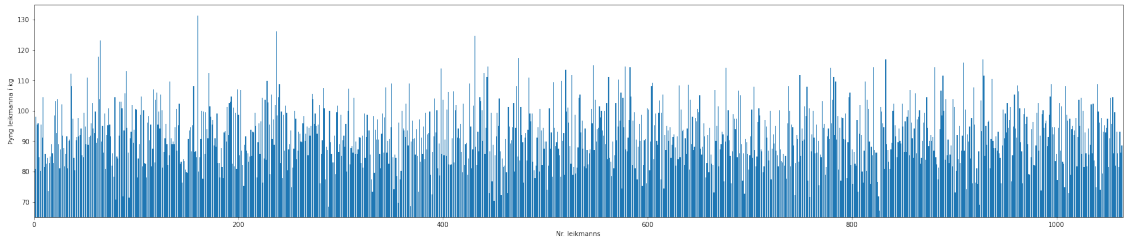
2 26 körfuboltamenn

2.1 a)

[ ]:
```
import numpy as np
import matplotlib.pyplot as plt

a,h,th = np.loadtxt('https://cs.hi.is/python/karfa.txt').T
n = [i for i in range(1,len(a)+1)]

plt.figure(figsize=(30,6))
plt.xlabel('Nr. leikmanns')
plt.ylabel('Aldur leikmanns í árum')
plt.xlim(0,1065)
# plt.yticks([i for i in range(1,51)])
aBar = plt.bar(n,a)
plt.show()

plt.figure(figsize=(30,6))
plt.xlabel('Nr. leikmanns')
plt.ylabel('Hæð leikmanna í cm')
plt.ylim(165,215)
# plt.yticks([i for i in range(100,200,5)])
plt.xlim(0,1065)
plt.bar(n,h)
plt.show()

plt.figure(figsize=(30,6))
plt.xlabel('Nr. leikmanns')
plt.ylabel('Þyng leikmanna í kg')
plt.xlim(0,1065)
plt.ylim(65,135)
plt.bar(n,th)
plt.show()
```

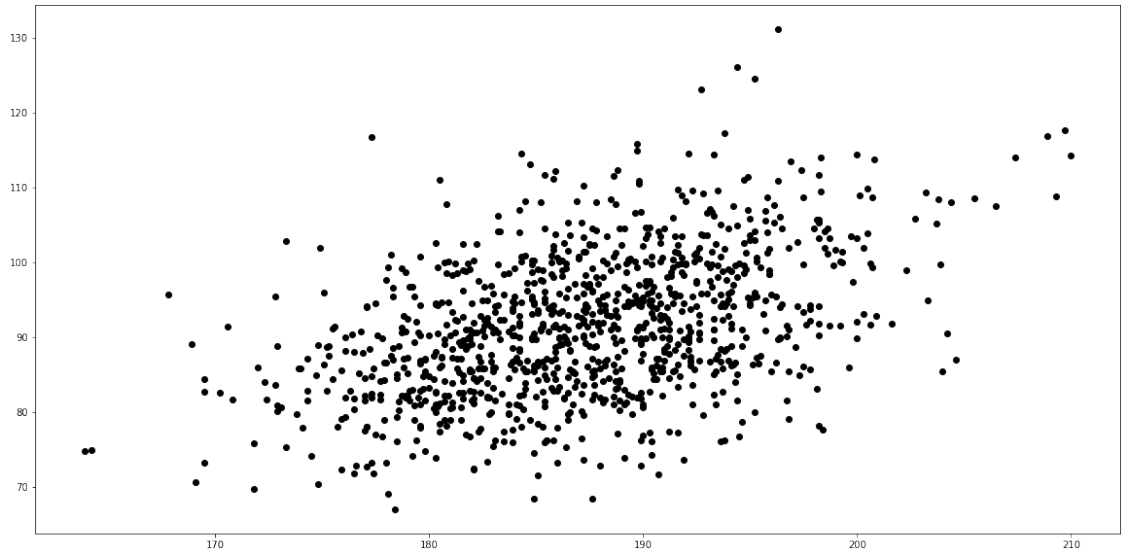






2.2 b)

[ ]:
```
plt.figure(figsize=(20,10))
xp = np.linspace(min(th), max(h))
plt.plot(h,th,'o', color="black")
# plt.plot(xp)
plt.show()
```



2.3 c)

[ ]:
```
medal = round(np.median(a))

yngri = []
eldri = []

for i in range(1064):
    if a[i] > medal: eldri.append(h[i])
    else: yngri.append(h[i])

print(f'Meðalhæð allra leikmanna: {np.median(h)}')
print(f'Meðalhæð eldri leikmanna: {np.median(eldri)}')
print(f'Meðalhæð yngri leikmanna: {np.median(yngri)}')
```

```
Meðalhæð allra leikmanna: 187.2
Meðalhæð eldri leikmanna: 186.2
Meðalhæð yngri leikmanna: 188.0
```

3 27

[ ]:
```
import numpy.linalg as nl

hneppi = np.array([[1,-8], [1,-7]])
utkoma = np.array([3,4])
reiknad = nl.solve(hneppi,utkoma)
print(f'Gripurinn kostar {int(reiknad[0])} peninga og það er/u␣
  ↪{int(reiknad[1])} kaupendur')
```

```
Gripurinn kostar 11 peninga og það er/u 1 kaupendur
```