Sketch a graph of f and the rectangles that make up the right Riemann sum R4 on the interval [0, 2]. This can be done by hand

In [1]:
```
import numpy as np
import pandas as pd
import math
```

In [2]:
```
f = lambda x: math.sqrt(4 - x**2)
```

In [15]:
```
# define a function based on above provided problem
# reference: https://pythonnumericalmethods.berkeley.edu/notebooks/chapter21.02-Riemanns-Integral.html

def riemann(a,b,n,f):
    x = (b-a)/n
    value = [f(a + k * x) * x for k in range(1, n + 1)]
    df = pd.Series(value)
    return df.sum()
```

Use the function you created in the previous problem to calculate R4

In [14]:
```
# assign and print

a = 0
b = 2
n = 4

print("R4: ", riemann(a,b,n,f))
```

```
R4:  2.4957090681024408
```

Calculate appropriate right Riemann sums to find the area under the curve y = f(x) on the interval [0, 2]. Does the value of this area have a special name

In [18]:
```
n2 = 50
n3 = 100
n4 = 1000
n5 = 1000000

print(riemann(a,b,n2,f))
print(riemann(a,b,n3,f))
print(riemann(a,b,n4,f))
print(riemann(a,b,n5,f))

print("Answer: We found pi... 3.14")
```

```
3.0982685110985
3.1204170317790467
3.1395554669110277
3.141590652413821
Answer: We found pi... 3.14
```