zad. 11.3

January 14, 2022

[34]:
```
using Printf

exact = 2.0
f(x) = sin(x)
```

[34]: f (generic function with 1 method)

[35]:
```
function trapez(f, a, b, n)
    h = (b - a) / n
    res = 0.0
    for i in 0:n
        if i==0 || i==n
            res += f(a + i*h) / 2.0
        else
            res += f(a + i*h)
        end
    end
    return res*h
end
```

[35]: trapez (generic function with 1 method)

[36]:
```
function Simpson(f, a, b, n)
    return (4.0 * trapez(f, a, b, n) - trapez(f, a, b, n/2)) / 3.0
end
```

[36]: Simpson (generic function with 1 method)

[37]:
```
# minimalne n dla złożonego wzoru trapezów to n=287

for i in 1:500
    if abs(trapez(f, 0.0, pi, i) - exact) <= 0.00002
        @printf("n = %.d\nT(f) = %lf\nbłąd: %e \n", i, trapez(f, 0.0, pi, i),␣
↪abs(trapez(f, 0.0, pi, i) - exact))
        break;
    end
end
```

```
n = 287
T(f) = 1.999980
błąd: 1.997035e-05
```

[39]:
```
# minimalne n dla złożonego wzoru Simpsona to n=16

for i in 1:50
    if abs(Simpson(f, 0.0, pi, i) - exact) <= 0.00002
        @printf("n = %.d\nS(f) = %lf\nbłąd: %e \n", i, Simpson(f, 0.0, pi, i),␣
↪abs(Simpson(f, 0.0, pi, i) - exact))
        break;
    end
end
```

```
n = 16
S(f) = 2.000017
błąd: 1.659105e-05
```