

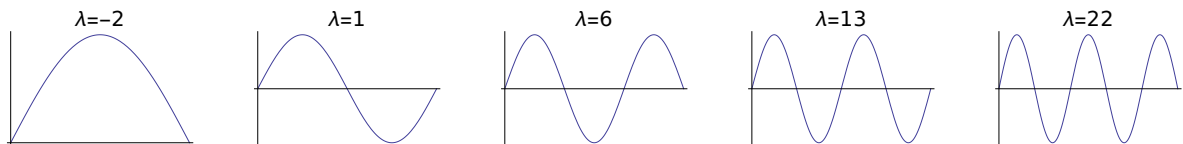
FOURIEROVA METODA

vlastní funkce a vlastní čísla

$$\lambda[k_] = k^2 - 3;$$

$$v[k_, x_] = \text{Sin}[k x];$$

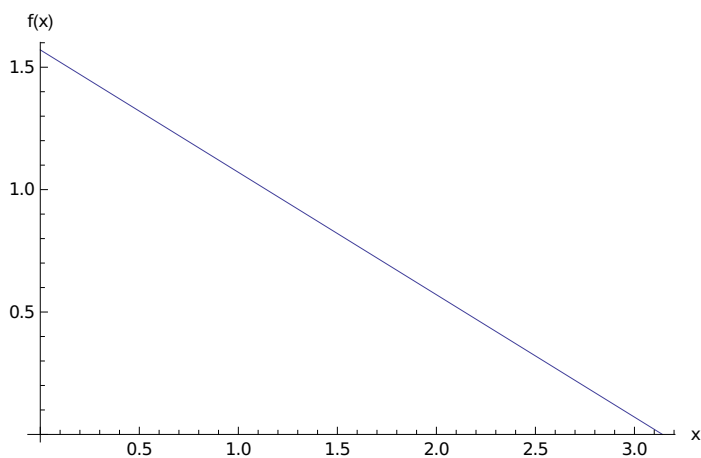
```
Show[
  GraphicsRow[
    Table[
      Plot[v[k, x], {x, 0, π}, PlotRange → All,
        Ticks → None, PlotLabel → "λ=" <> ToString[TraditionalForm[λ[k]]]],
      {k, 1, 5}
    ]
  ]
]
```



pravá strana

$$f[x_] = (\pi - x) / 2;$$

```
Plot[f[x], {x, 0, π}, AxesLabel → {"x", "f(x)"}]
```



Fourierovy koeficienty

```

norma2[k_] = Integrate[v[k, x]^2, {x, 0, π}]
d[k_] := Integrate[f[x] v[k, x], {x, 0, π}] / norma2[k]
c[k_] := d[k] / λ[k]

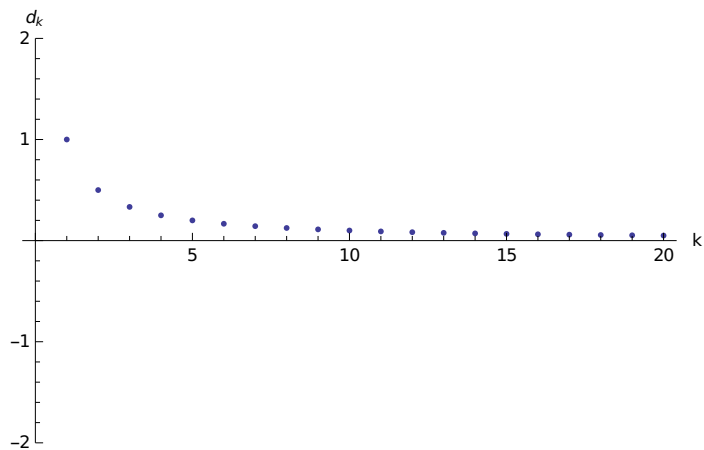
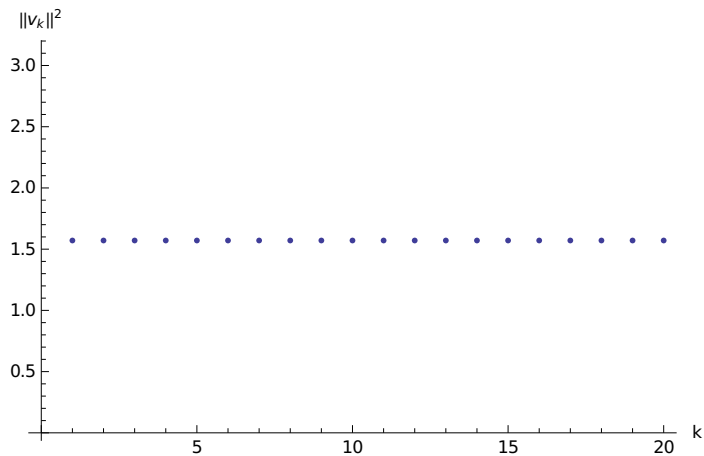
```

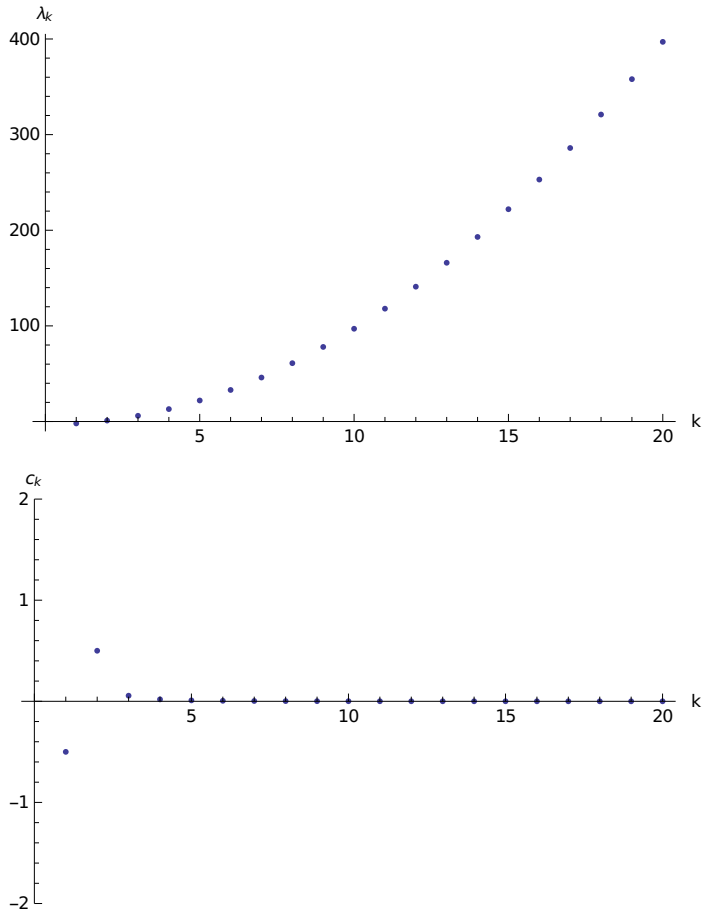
$$\frac{\pi}{2} \frac{\sin[2 k \pi]}{4 k}$$

```

ListPlot[Table[norma2[k], {k, 1, 20}], AxesLabel → {"k", "||v_k||^2"}]
ListPlot[Table[d[k], {k, 1, 20}], AxesLabel → {"k", "d_k"}, PlotRange → {-2, 2}]
ListPlot[Table[λ[k], {k, 1, 20}], AxesLabel → {"k", "λ_k"}]
ListPlot[Table[c[k], {k, 1, 20}], AxesLabel → {"k", "c_k"}, PlotRange → {-2, 2}]

```



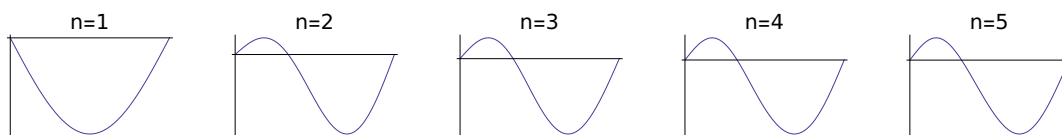


řešení okrajové úlohy

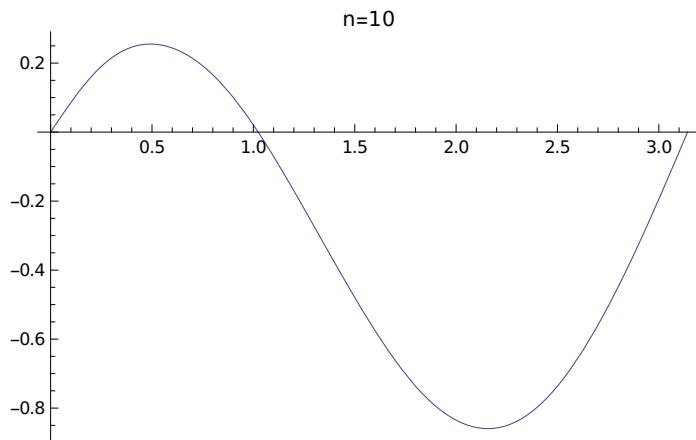
```

y[n_, x_] := Sum[c[k] * v[k, x], {k, 1, n}]
Show[
  GraphicsRow[
    Table[
      Plot[Evaluate[y[k, x]], {x, 0,  $\pi$ },
        PlotRange -> All, Ticks -> None, PlotLabel -> "n=" <> ToString[k]],
      {k, 1, 5}
    ]
  ]
]

```



```
Plot[Evaluate[y[10, x]], {x, 0,  $\pi$ }, PlotRange -> All, PlotLabel -> "n=10"]
```



```
Manipulate[Plot[Evaluate[y[n, x]], {x, 0,  $\pi$ }], {n, 1, 10}]
```

