

In[1338]:= (*Problem #9a plot fourier cosine series of a SINE function*)

Clear[a, b, M, x, n, L, f]

a[n_] := Integrate[f[x] * Cos[(n * Pi / L) * x], {x, 0, L}] * (2 / L)

b[n_] := Integrate[f[x] * Sin[(n * Pi / L) * x], {x, 0, L}] * (2 / L)

f[x_] := Sin[Pi * x / L]

L := Pi

a[n]

b[n]

myFCos[x_, M_] := Sum[a[n] * Cos[(n * Pi / L) * x], {n, 1, M}] + a[0] / 2

myFSin[x_, M_] := Sum[b[n] * Sin[(n * Pi / L) * x], {n, 1, M}]

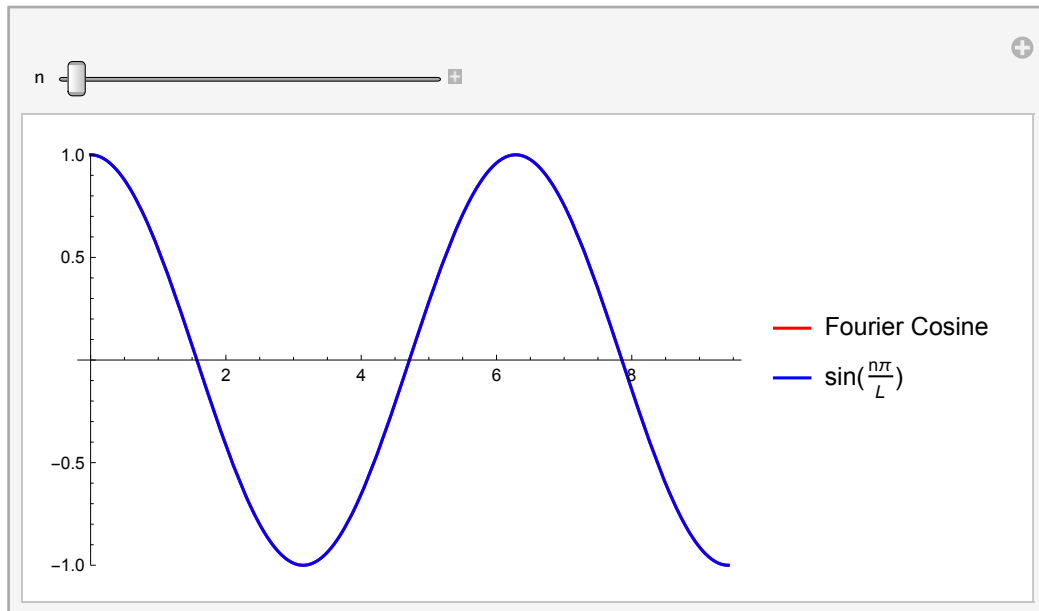
Manipulate[Plot[{Evaluate[myFCos[x, n]], f[x]}, {x, 0, 3 L}, PlotRange → f[L],

PlotStyle → {Red, Blue}, PlotLegends → {"Fourier Cosine", "sin($\frac{n\pi}{L}$)"}], {n, 1, 10}]

Out[1343]=
$$\frac{2 (1 + \cos[n \pi])}{(1 - n^2) \pi}$$

Out[1344]=
$$-\frac{2 \sin[n \pi]}{(-1 + n^2) \pi}$$

Out[1347]=



```

In[1388]:= (*Problem #9b plot fourier sine series of a COSINE function*)
Clear[a, b, M, x, n, L, f]
a[n_] := Integrate[f[x] * Cos[(n * Pi / L) * x], {x, 0, L}] * (2 / L)
b[n_] := Integrate[f[x] * Sin[(n * Pi / L) * x], {x, 0, L}] * (2 / L)
f[x_] := Cos[Pi * x / L]
L := Pi

a[n];
b[n];

myFCos[x_, M_] := Sum[a[n] * Cos[(n * Pi / L) * x], {n, 1, M}] + a[0] / 2
myFSin[x_, M_] := Sum[b[n] * Sin[(n * Pi / L) * x], {n, 1, M}]

Plot[{Evaluate[myFSin[x, 35]], f[x]}, {x, 0, 2 L}, PlotRange → {-1.5, 1.5},
  PlotStyle → {Red, Blue}, PlotLegends → {"Fourier Sine", "f[x]=cos( $\frac{n\pi}{L}$ )"}]

```

