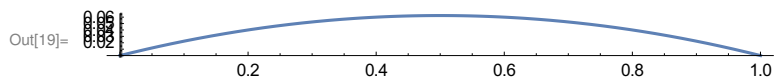


# Fourier Series Solution 13.4.1

In[17]:=  $f[x_, L_] = x (L - x) / 4$

Out[17]=  $\frac{1}{4} (L - x) x$

In[19]:= `Plot[f[x, 1], {x, 0, 1}, AspectRatio -> Automatic]`



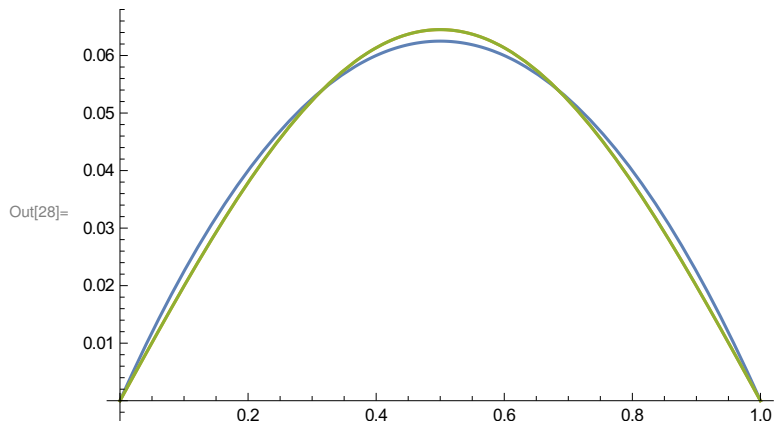
In[25]:=  $b[j_, L_] = (2 / L) \text{Integrate}[f[x, L] \text{Sin}[j \text{Pi} x / L], \{x, 0, L\}]$

Out[25]=  $-\frac{L^2 (-2 + 2 \text{Cos}[j \pi] + j \pi \text{Sin}[j \pi])}{2 j^3 \pi^3}$

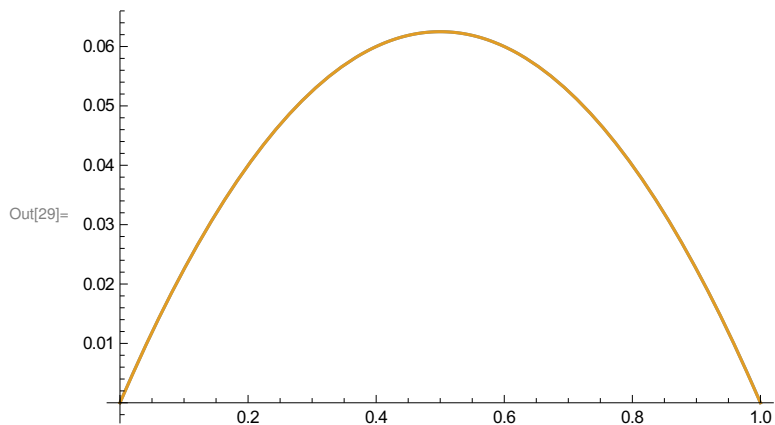
In[26]:=  $fk[x_, k_, L_] := \text{Sum}[b[j, L] \text{Sin}[j \text{Pi} x / L], \{j, 1, k\}]$

In[4]:=

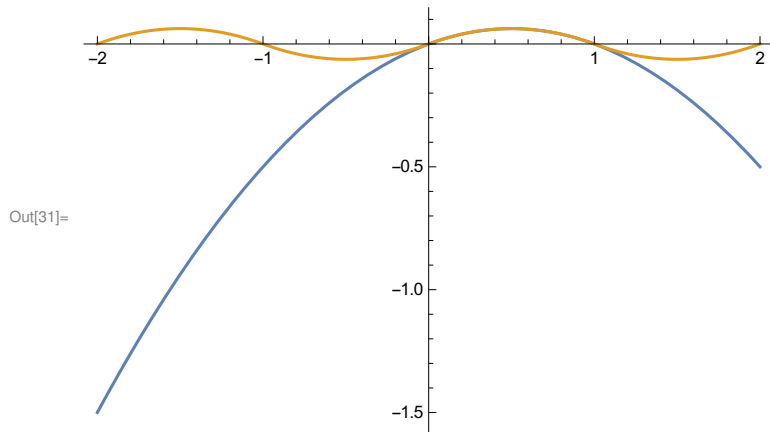
In[28]:= `Plot[{f[x, 1], fk[x, 1, 1], fk[x, 2, 1]}, {x, 0, 1}]`



In[29]:= `Plot[{f[x, 1], fk[x, 20, 1]}, {x, 0, 1}, PlotRange -> All, AxesOrigin -> {0, 0}]`



```
In[31]:= Plot[{f[x, 1], fk[x, 20, 1]}, {x, -2, 2}, PlotRange -> All, AxesOrigin -> {0, 0}]
```



```
In[32]:= B[t_, j_, L_] = Cos[j Pi t / L]
```

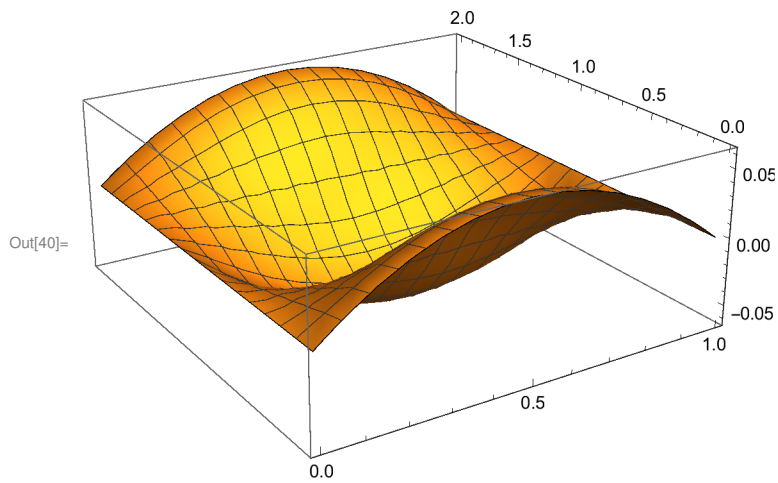
```
Out[32]= Cos[ $\frac{j \pi t}{L}$ ]
```

```
In[33]:= A[x_, j_, L_] = Sin[j Pi x / L]
```

```
Out[33]= Sin[ $\frac{j \pi x}{L}$ ]
```

```
In[39]:= u[x_, t_, k_, L_] := Sum[b[j, L] A[x, j, L] B[t, j, L], {j, 1, k}]
```

```
In[40]:= Plot3D[u[x, t, 10, 1], {x, 0, 1}, {t, 0, 2}]
```



```
In[44]:= Animate[Plot[u[x, t, 10, 1], {x, 0, 1}, PlotRange → {-0.08, 0.08}], {t, 0, 2}]
```

