In[1]:=
```
(* Cosine Wave *)
```

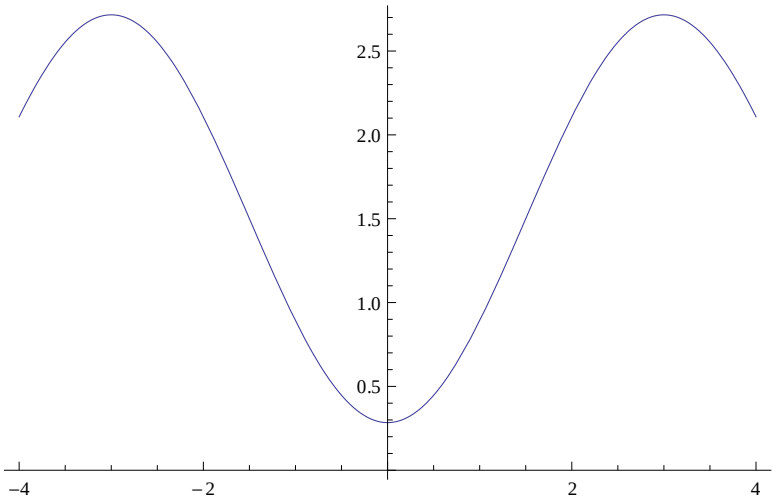
In[2]:=
```
f[x_] := x
```

In[11]:=
```
sum[m_, x_] = 3 / 2 + Sum[-(12 / (Pi^2 (2 k - 1)^2)) Cos[(2 k - 1) Pi * x / 3], {k, 1, m}]
```

Out[11]=
$$\frac{3}{2}-\frac{1}{2\pi^2}3\,e^{-\frac{1}{3}i\pi x}\left(\text{LerchPhi}\left[e^{-\frac{2}{3}i\pi x},2,\frac{1}{2}\right]-\left(e^{-\frac{2}{3}i\pi x}\right)^{m}\text{LerchPhi}\left[e^{-\frac{2}{3}i\pi x},2,\frac{1}{2}+m\right]+e^{\frac{2i\pi x}{3}}\text{LerchPhi}\left[e^{\frac{2i\pi x}{3}},2,\frac{1}{2}\right]-\left(e^{\frac{2i\pi x}{3}}\right)^{1+m}\text{LerchPhi}\left[e^{\frac{2i\pi x}{3}},2,\frac{1}{2}+m\right]\right)$$

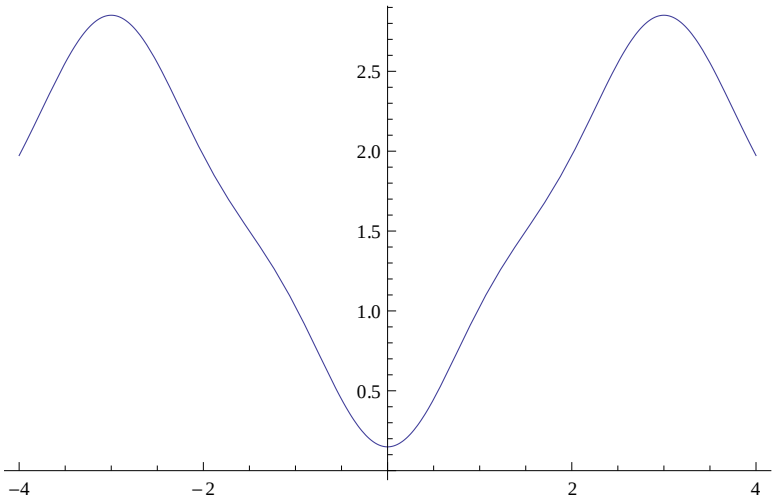
In[12]:=
```
Plot[sum[1, x], {x, -4, 4}]
```

Out[12]=



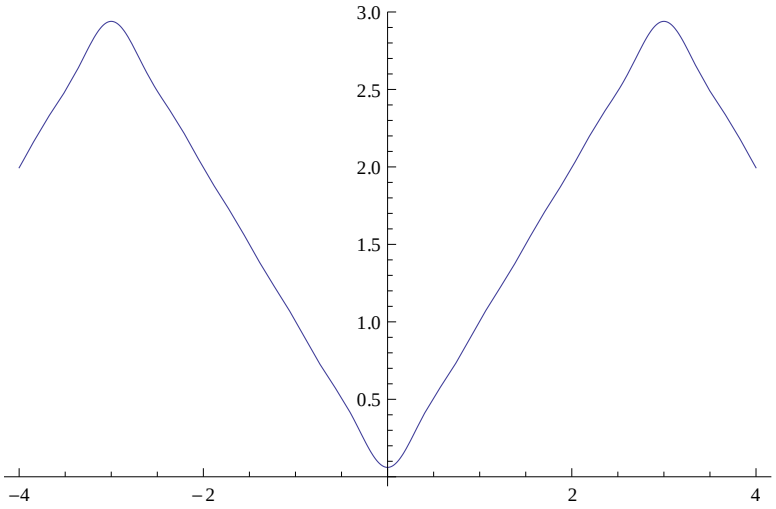
In[13]:=
```
Plot[sum[2, x], {x, -4, 4}]
```

Out[13]=



In[15]:=
```
Plot[sum[5, x], {x, -4, 4}]
```

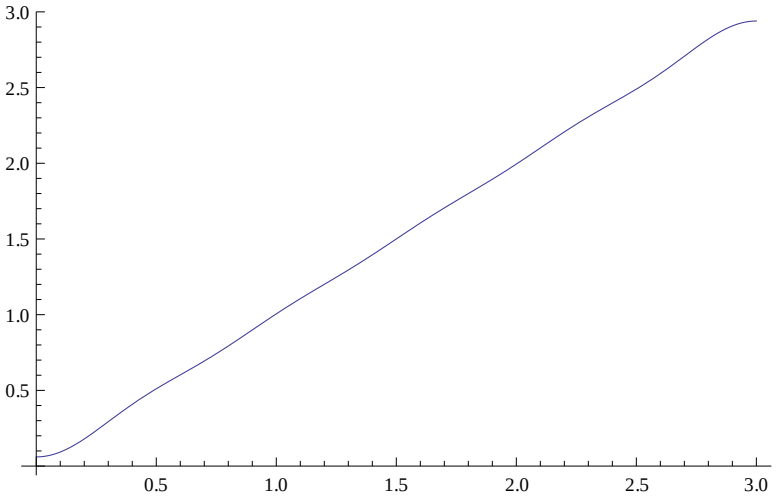
Out[15]=



In[17]:=
```
wave[m_, x_, t_] :=
 3 / 2 + Sum[-(12 / (Pi^2 (2 k - 1)^2)) Cos[(2 k - 1) Pi * x / 3] Cos[(2 k - 1) Pi * t / 3], {k, 1, m}]
```

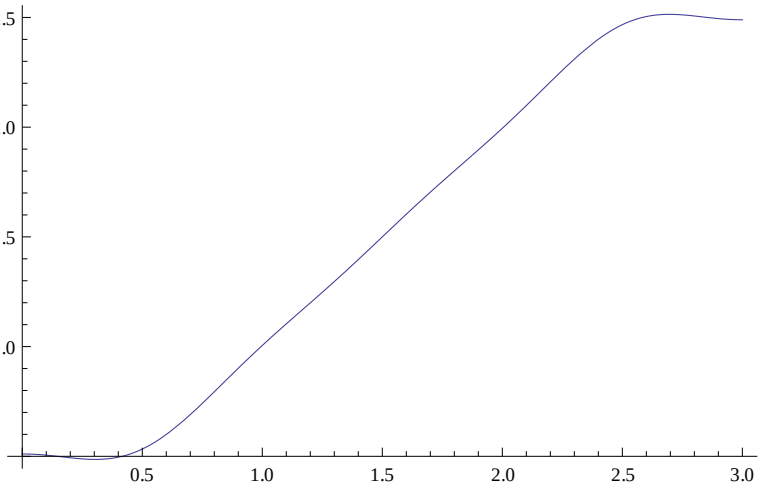
In[18]:=
```
Plot[wave[5, x, 0], {x, 0, 3}]
```

Out[18]=



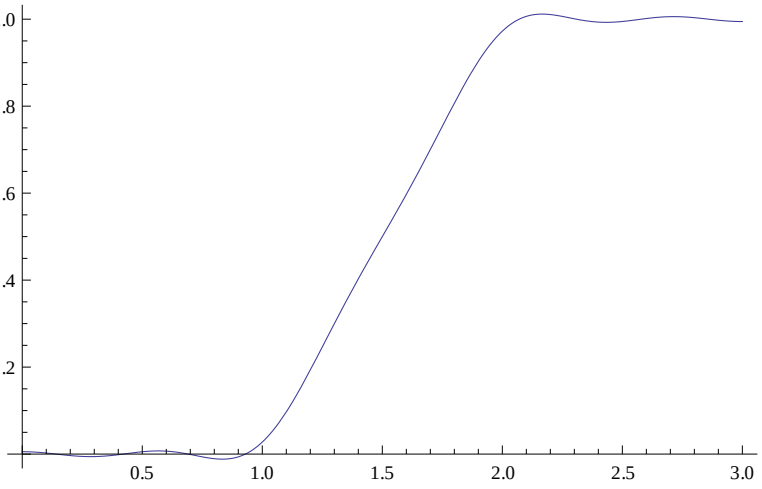
In[21]:=
```
Plot[wave[5, x, 0.5], {x, 0, 3}]
```

Out[21]=



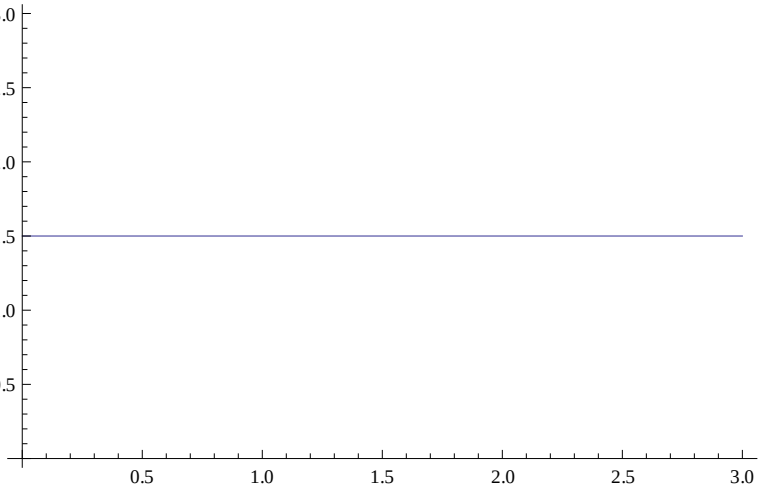
In[19]:=
```
Plot[wave[5, x, 1], {x, 0, 3}]
```

Out[19]=



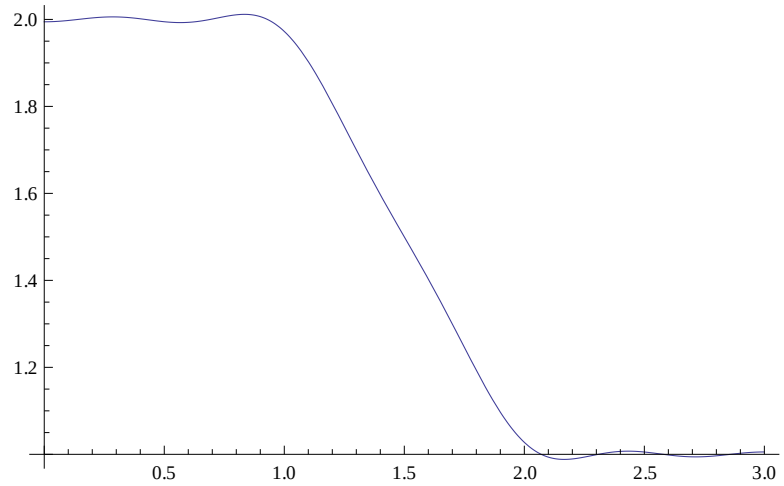
In[22]:=
```
Plot[wave[5, x, 1.5], {x, 0, 3}]
```

Out[22]=



In[20]:=
```
Plot[wave[5, x, 2], {x, 0, 3}]
```

Out[20]=



In[25]:=
```
D[wave[1, x, t], {x, 2}] - D[wave[1, x, t], {t, 2}]
```

Out[25]= 0

In[27]:=
```
D[wave[4, x, t], {x, 2}] - D[wave[4, x, t], {t, 2}]
```

Out[27]= 0