

```
> restart;  
> T:= cos(n*arccos(x));
```

$T := \cos(n \arccos(x))$ (1)

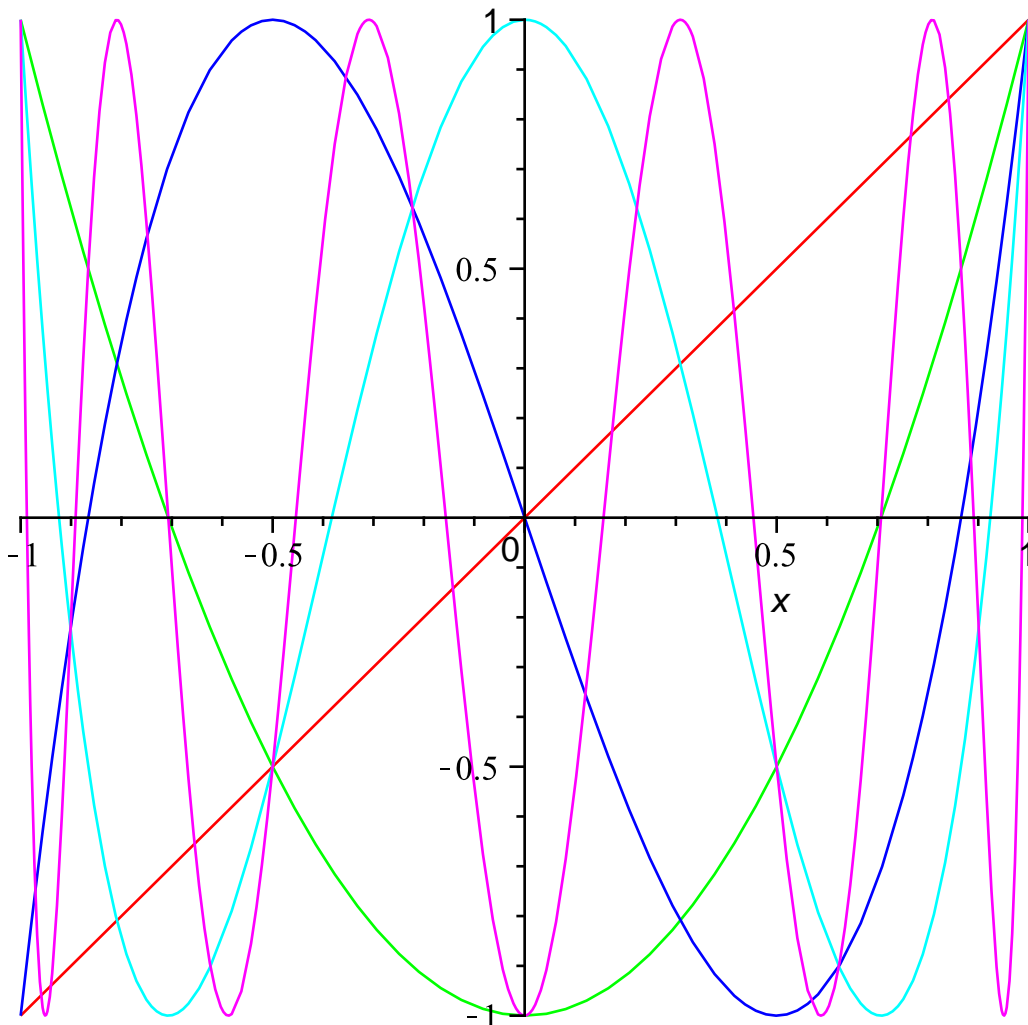
```
> ns := [1,2,3,4,10];
```

$ns := [1, 2, 3, 4, 10]$ (2)

```
> for k in ns do  
  Tn[k]:=expand(subs(n=k,T));  
od;
```

$T_{n_1} := x$
 $T_{n_2} := 2x^2 - 1$
 $T_{n_3} := 4x^3 - 3x$
 $T_{n_4} := 8x^4 - 8x^2 + 1$
 $T_{n_{10}} := 512x^{10} - 1280x^8 + 1120x^6 - 400x^4 + 50x^2 - 1$ (3)

```
> plot([seq(Tn[k],k in ns)],x=-1..1,color=[red,green,blue,cyan,  
magenta]);
```



```
> simplify((1-x^2)*diff(T,x$2)-x*diff(T,x)+n^2*T);
```

0

(4)

```
> for k from 0 to 4 do
```

```
  seq(int(expand(subs(n=k,T))*expand(subs(n=m,T))*1/sqrt(1-  
x^2),x=-1..1), m=0..4);
```

```
od;
```

$\pi, 0, 0, 0, 0$

$0, \frac{1}{2} \pi, 0, 0, 0$

$0, 0, \frac{1}{2} \pi, 0, 0$

$0, 0, 0, \frac{1}{2} \pi, 0$

$0, 0, 0, 0, \frac{1}{2} \pi$

(5)