```
clear
close
clc

syms x alpha beta real

n = 10;
P = JacobiPolynomialsSym(alpha,beta,n,x);
ChebyshevTPoly = simplify(subs(P,[alpha beta], [-1/2 -1/2])./subs(P,[alpha beta x],
[-1/2 -1/2 1]))'
```

ChebyshevTPoly =

$$\begin{pmatrix} 1 \\ x \\ 2x^2 - 1 \\ x\,(4x^2 - 3) \\ 8x^4 - 8x^2 + 1 \\ x\,(16x^4 - 20x^2 + 5) \\ 32x^6 - 48x^4 + 18x^2 - 1 \\ x\,(64x^6 - 112x^4 + 56x^2 - 7) \\ 128x^8 - 256x^6 + 160x^4 - 32x^2 + 1 \\ x\,(256x^8 - 576x^6 + 432x^4 - 120x^2 + 9) \\ 512x^{10} - 1280x^8 + 1120x^6 - 400x^4 + 50x^2 - 1 \end{pmatrix}$$

```
set(groot,"defaultAxesTickLabelInterpreter","latex")
set(groot,"defaultTextInterpreter","latex")
set(groot,"defaultLegendInterpreter","latex")

figure("Position",[100 100 600 600])
box on;
grid on;
hold on;
axis tight;
xlabel("$x$","FontSize",12)
ylabel("$T_n(x)$","FontSize",12)
title("Chebyshev Polynomials of the First Kind","FontSize",14)

for i = 2:n
    fplot(ChebyshevTPoly(i),[-1 1],LineWidth=1.5)
end

legends = cell(1, n-1);
for i = 1:n-1
    legends{i} = sprintf('$n = %d$',i);
end
```

```
legend(legends, 'Location', 'southoutside', 'NumColumns', 3,'FontSize',12);
```