

```

[ >
[ > p:=x^7-x^6+x^5-x^4-2*x^3+2*x^2-2*x+2;
      p := x^7 - x^6 + x^5 - x^4 - 2 x^3 + 2 x^2 - 2 x + 2
[ > q:=x^5-4*x^2+3*x^3-12;
      q := x^5 - 4 x^2 + 3 x^3 - 12
[
[ > factor(p);
      (x - 1) (x^2 + 1) (x^4 - 2)
[ > factor(p, 2^(1/4));
      (x^2 + 1) (x^2 + sqrt(2)) (x - 2^(1/4)) (x + 2^(1/4)) (x - 1)
[ > factor(p, I);
      (x^4 - 2) (x - I) (x + I) (x - 1)
[ > factor(p, {I, 2^(1/4)});
(x - I) (x + I) (x - I 2^(1/4)) (x + I 2^(1/4)) (x - 2^(1/4))
(x + 2^(1/4)) (x - 1)
[ > factor(p, real);
(x + 1.189207115) (x - 1.) (x - 1.189207115)
(x^2 + 1.414213562) (x^2 + 1.)
[ > factor(p, complex);
(x + 1.189207115) (x + 1.189207115 I) (x + 1. I) (x - 1. I)
(x - 1.189207115 I) (x - 1.) (x - 1.189207115)
[ > Factor(p) mod 2;
      x^4 (x + 1)^3
[ > Factor(p) mod 3;
      (x^2 + x + 2) (x^2 + 2 x + 2) (x + 2) (x^2 + 1)

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> factor (q) ;
          (x3 - 4) (x2 + 3)
> factor (q, (-3) ^ (1/2) ) ;
          -(x3 - 4) (-x + I√3) (x + I√3)
> factor (q, (4) ^ (1/3) ) ;
          (x2 + 3) (x2 + x 2(2/3) + 2 2(1/3)) (x - 2(2/3))
[
> factor (q, { (-3) ^ (1/2) , (4) ^ (1/3) } ) ;
1
4 (x - I√3) (x + I√3) (2x - I√3 2(2/3) + 2(2/3))
(2x + I√3 2(2/3) + 2(2/3)) (x - 2(2/3))
> factor (q, real) ;
(x - 1.587401052) (x2 + 1.587401052 x + 2.519842100)
(x2 + 3.0000000001)
> factor (q, complex) ;
(x + .7937005260 + 1.374729637 I)
(x + .7937005260 - 1.374729637 I) (x + 1.732050808 I)
(x - 1.732050808 I) (x - 1.587401052)
> Factor (q) mod 2 ;
          x3 (x + 1)2
> Factor (q) mod 3 ;
          (x + 2)3 x2
[
>
>
> a[0] := 0 ; a[1] := 1 ; b[0] := 1 ; b[1] := 1 ; for k from

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0 to 20 do
> a[k+2] := (2*k+3) * a[k+1] + (k+1) ^ 2 * a[k];
> b[k+2] := (2*k+3) * b[k+1] + (k+1) ^ 2 * b[k];
> c[k+2] := 4 * a[k+2] / b[k+2];
> od;
```

$$a_0 := 0$$

$$a_1 := 1$$

$$b_0 := 1$$

$$b_1 := 1$$

$$a_2 := 3$$

$$b_2 := 4$$

$$c_2 := 3$$

$$a_3 := 19$$

$$b_3 := 24$$

$$c_3 := \frac{19}{6}$$

$$a_4 := 160$$

$$b_4 := 204$$

$$c_4 := \frac{160}{51}$$

$$a_5 := 1744$$

$$b_5 := 2220$$

$$c_5 := \frac{1744}{555}$$

$$a_6 := 23184$$

$$b_6 := 29520$$

$$c_6 := \frac{644}{205}$$

$$a_7 := 364176$$

$$b_7 := 463680$$

$$c_7 := \frac{2529}{805}$$

$$a_8 := 6598656$$

$$b_8 := 8401680$$

$$c_8 := \frac{183296}{58345}$$

$$a_9 := 135484416$$

$$b_9 := 172504080$$

$$c_9 := \frac{3763456}{1197945}$$

$$a_{10} := 3108695040$$

$$b_{10} := 3958113600$$

$$c_{10} := \frac{4317632}{1374345}$$

$$a_{11} := 78831037440$$

$$b_{11} := 100370793600$$

$$c_{11} := \frac{54743776}{17425485}$$

$$a_{12} := 2189265960960$$

$$b_{12} := 2787459998400$$

$$c_{12} := \frac{1013549056}{322622685}$$

$$a_{13} := 66083318415360$$

$$b_{13} := 84139894238400$$

$$c_{13} := \frac{30594128896}{9738413685}$$

$$a_{14} := 2154235544616960$$

$$b_{14} := 2742857884166400$$

$$c_{14} := \frac{35618973952}{11337871545}$$

$$a_{15} := 75425161203302400$$

$$b_{15} := 96034297911552000$$

$$c_{15} := \frac{10392576224}{3308059755}$$

$$a_{16} := 2822882994841190400$$

$$b_{16} := 3594206259195552000$$

$$c_{16} := \frac{3111643512832}{990466892415}$$

$$a_{17} := 112463980097804697600$$

$$b_{17} := 143193586818810528000$$

$$c_{17} := \frac{123968232030208}{39460313827935}$$

$$a_{18} := 4752052488932268441600$$

$$b_{18} := 6050501147565883008000$$

$$c_{18} := \frac{48501417558016}{15438480702645}$$

$$a_{19} := 212264271642182654361600$$

$$b_{19} := 270263264589232282368000$$

$$c_{19} := \frac{1083228572868608}{344802363740835}$$

$$a_{20} := 9993797542549672427520000$$

$$b_{20} := 12724498233251342778240000$$

$$c_{20} := \frac{4080033616887808}{1298715036217599}$$

$$a_{21} := 494651407901409631272960000$$

$$b_{21} := 629809733398997966855040000$$

$$c_{21} := \frac{188557135970304}{60019600489849}$$

$$a_{22} := 25677275256025019685273600000$$

$$b_{22} := 32693322257020754739970560000$$

$$c_{22} := \frac{3781715948011520}{1203757572990973}$$

```
> evalf(seq(c[k], k=2..10));
3., 3.166666667, 3.137254902, 3.142342342, 3.141463415,
3.141614907, 3.141588825, 3.141593312, 3.141592540
> for k from 2 while evalf(abs(c[k]-Pi), 15) >
(10^(-10)) do;
> print(k, c[k], evalf(abs(c[k]-Pi), 15));
> od;
```

2, 3, .14159265358979

3, $\frac{19}{6}$, .02507401307688

4, $\frac{160}{51}$, .00433775162901

$$5, \frac{1744}{555}, .00074968875255$$

$$6, \frac{644}{205}, .00012923895564$$

$$7, \frac{2529}{805}, .00002225324251$$

$$8, \frac{183296}{58345}, .382849767 \cdot 10^{-5}$$

$$9, \frac{3763456}{1197945}, .65829014 \cdot 10^{-6}$$

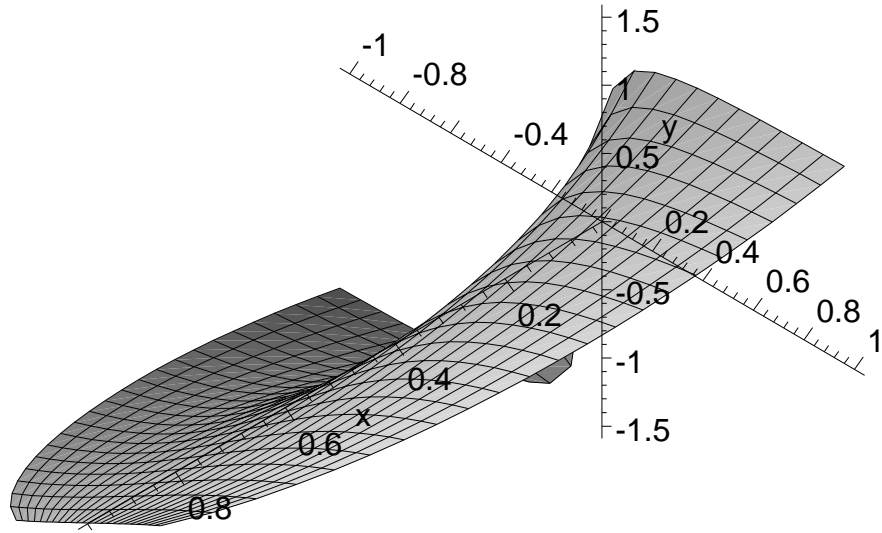
$$10, \frac{4317632}{1374345}, .11314325 \cdot 10^{-6}$$

$$11, \frac{54743776}{17425485}, .1944054 \cdot 10^{-7}$$

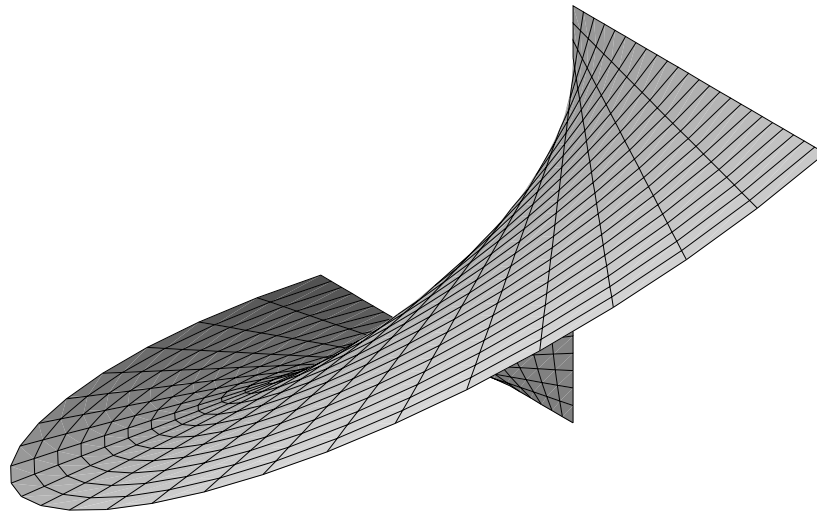
$$12, \frac{1013549056}{322622685}, .333954 \cdot 10^{-8}$$

$$13, \frac{30594128896}{9738413685}, .57358 \cdot 10^{-9}$$

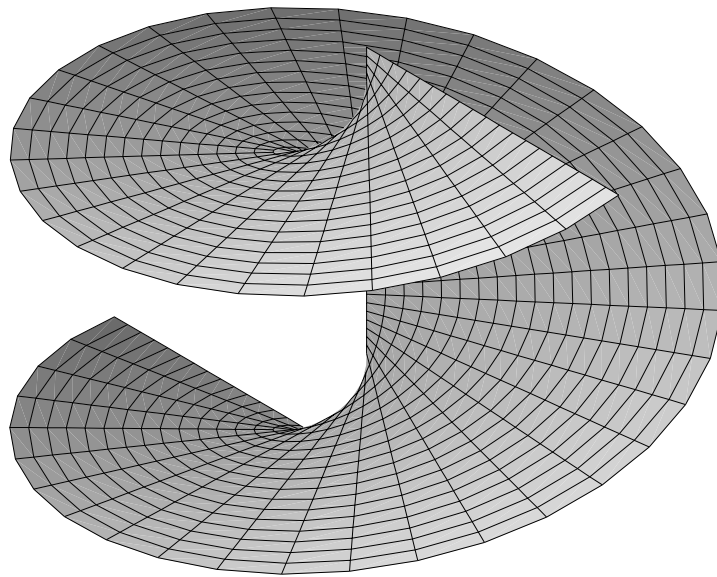
```
> plot3d(arctan(y/x), x=0..1, y=-sqrt(1-x^2)..sqrt(1-x^2), axes=normal);
```

```
> plot3d([r,phi,phi],r=0..1,phi=-Pi/2..Pi/2,c  
oords=cylindrical);
```



```
> plot3d([r,phi,phi],r=0..1,phi=-Pi/2..5*Pi/2  
,coords=cylindrical,grid=[20,50]);
```



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[ >
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```
[ > with (plots) ;
```

```
[ animate, animate3d, animatecurve, changecoords, complexplot,  
complexplot3d, conformal, contourplot, contourplot3d, coordplot,  
coordplot3d, cylinderplot, densityplot, display, display3d,  
fieldplot, fieldplot3d, gradplot, gradplot3d, implicitplot,
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implicitplot3d, inequal, listcontplot, listcontplot3d, listdensityplot, listplot, listplot3d, loglogplot, logplot, matrixplot, odeplot, pareto, pointplot, pointplot3d, polarplot, polygonplot, polygonplot3d, polyhedra_supported, polyhedraplot, replot, rootlocus, semilogplot, setoptions, setoptions3d, spacecurve, sparsematrixplot, sphereplot, surfdata, textplot, textplot3d, tubeplot]

```
[ > animate3d(cos(x*cos(y-a)+a), x=0..2*Pi, y=0..
[ Pi, a=0..2*Pi, frames=10) :
[ >
```