

Determine todos os valores de  $(1 + 3i)^{\frac{1}{5}}$

```
> z:=1+3*I;
z:= 1 + 3 I
```

(1)

```
> zp:=abs(z)*exp(I*argument(z)+I*2*Pi*k);
zp:=sqrt(10)*e^{I*arctan(3)+2*I*Pi*k}
```

(2)

```
> r:=abs(z)^(1/5)*exp(I*argument(z)/5+I*2*Pi*k/5);
r:=10^{1/10}*e^{I*arctan(3)/5+I*2*Pi*k/5}
```

(3)

```
> rf:=unapply(r,k);
rf:=k->10^{1/10}*e^{I*arctan(3)/5+I*2*Pi*k/5}
```

(4)

```
> rf(4);
10^{1/10}*e^{I*arctan(3)+I*8*Pi/5}
```

(5)

```
> omega:=seq(rf(k),k=0..4);
omega:= [10^{1/10}*((1/10+3/10*I)*sqrt(10))^{1/5}, 10^{1/10}*e^{I*arctan(3)/5+I*2*Pi/5}, 10^{1/10}*e^{I*arctan(3)/5+I*4*Pi/5}, 10^{1/10}*e^{I*arctan(3)/5+I*6*Pi/5}, 10^{1/10}*e^{I*arctan(3)/5+I*8*Pi/5}]
```

(6)

```
> evalf(omega);
omega2:= [1.219847889 + 0.3112303346 I, 0.08095609040 + 1.256319746 I, -1.169814273 + 0.4652179697 I, -0.8039410717 - 0.9687992291 I, 0.6729513656 - 1.063968821 I]
```

(7)

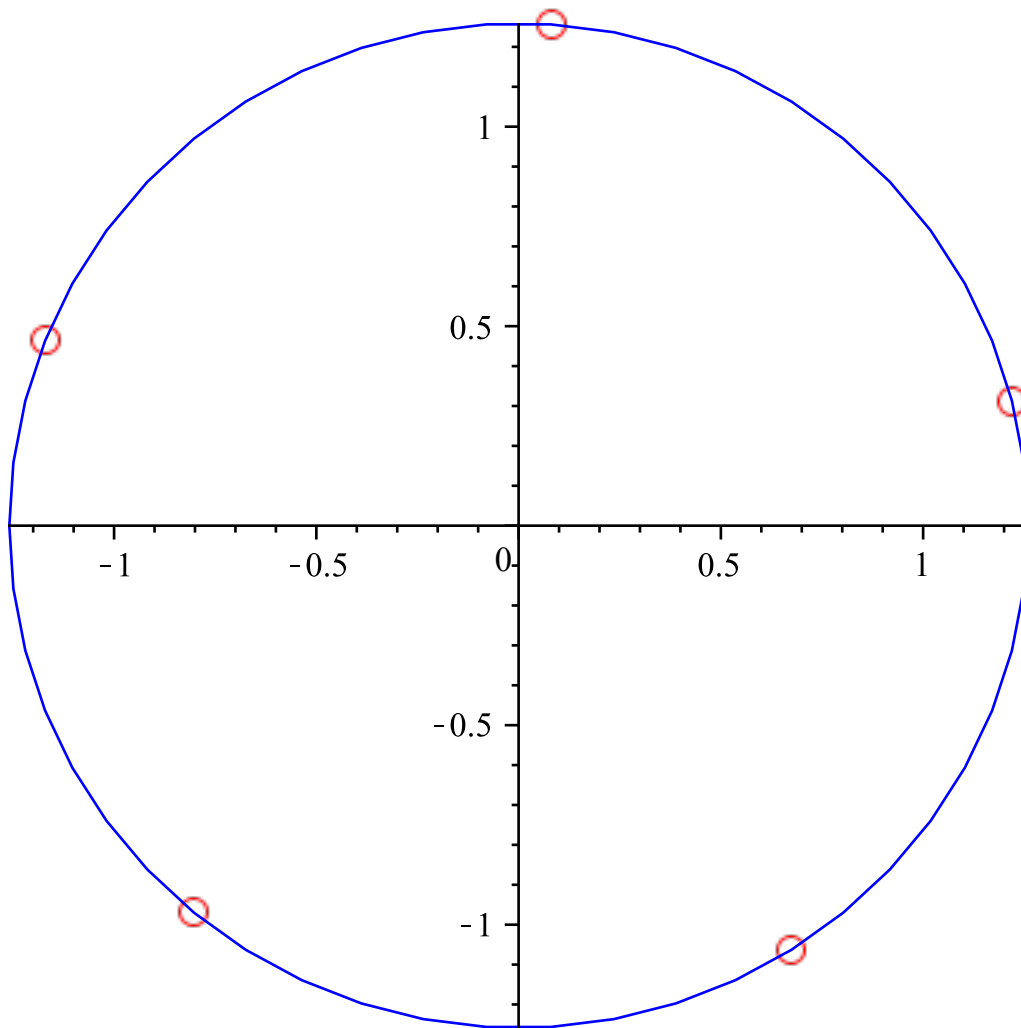
```
> with(plottools):with(plots):
> pontos:=map(w->[Re(w),Im(w)],omega);
pontos:= [[10^{1/10}*Re(((1/10+3/10*I)*sqrt(10))^{1/5}), 10^{1/10}*Im(((1/10+3/10*I)*sqrt(10))^{1/5})], [10^{1/10}*Re(e^{I*arctan(3)/5+I*2*Pi/5}), 10^{1/10}*Im(e^{I*arctan(3)/5+I*2*Pi/5})], [10^{1/10}*Re(e^{I*arctan(3)/5+I*4*Pi/5}), 10^{1/10}*Im(e^{I*arctan(3)/5+I*4*Pi/5})], [10^{1/10}*Re(e^{I*arctan(3)/5+I*6*Pi/5}), 10^{1/10}*Im(e^{I*arctan(3)/5+I*6*Pi/5})], [10^{1/10}*Re(e^{I*arctan(3)/5+I*8*Pi/5}), 10^{1/10}*Im(e^{I*arctan(3)/5+I*8*Pi/5})]]
```

(8)

```
> omega2:=evalf(%);
omega2:= [[1.219847889, 0.3112303346], [0.08095609066, 1.256319746], [-1.169814274, 0.4652179695], [-0.8039410721, -0.9687992288], [0.6729513658, -1.063968822]]
```

(9)

```
> p1:=pointplot(omega2,symbol=circle,symbolsize=22,color=red);
> c1:=circle([0,0],abs(z)^(1/5),color=blue);
> display([p1,c1]);
```



```
> solve(w^5=z,w);
```

$$\begin{aligned}
 & (1+3I)^{1/5}, \left( \frac{1}{4}\sqrt{5} - \frac{1}{4} + \frac{1}{4}I\sqrt{2}\sqrt{5+\sqrt{5}} \right) (1+3I)^{1/5}, \left( -\frac{1}{4}\sqrt{5} - \frac{1}{4} \right. \\
 & \quad \left. + \frac{1}{4}I\sqrt{2}\sqrt{5-\sqrt{5}} \right) (1+3I)^{1/5}, \left( -\frac{1}{4}\sqrt{5} - \frac{1}{4} - \frac{1}{4}I\sqrt{2}\sqrt{5-\sqrt{5}} \right) (1 \\
 & \quad + 3I)^{1/5}, \left( \frac{1}{4}\sqrt{5} - \frac{1}{4} - \frac{1}{4}I\sqrt{2}\sqrt{5+\sqrt{5}} \right) (1+3I)^{1/5}
 \end{aligned} \tag{10}$$

```
> evalf(%);
```

$$\begin{aligned}
 & 1.219847889 + 0.3112303344 I, 0.08095609053 + 1.256319746 I, -1.169814273 \\
 & \quad + 0.4652179692 I, -0.8039410720 - 0.9687992285 I, 0.6729513655 - 1.063968821 I
 \end{aligned} \tag{11}$$

