We know from de Moivre's theorem that

$$\cos(3t) + i\sin(3t) = (\cos(t) + i\sin(t))^3.$$

Let us see what MAPLE says these are.

```
>   cos(3*t)+I*sin(3*t);
```

$$\cos(3\,t) + I\sin(3\,t)$$

```
>   (cos(t)+I*sin(t))^3;
```

$$(\cos(t) + I\sin(t))^3$$

```
>   evalc(%);
```

$$\cos(t)^3 - 3\cos(t)\sin(t)^2 + I\,(3\cos(t)^2\sin(t) - \sin(t)^3)$$

We then take real and imaginary parts to obtain

$$\cos(3t) = \cos^3(t) - 3\cos(t)\sin^2(t),$$

$$\sin(3t) = 3\cos^2(t)\sin(t) - \sin^3(t).$$