```
> #Example from class (Details)
> # First define the differential equation:
  Eqn1:=diff(y(t),t$2)+diff(y(t),t)+y(t)=cos(w*t);
```

$$Eqn1 := \frac{d^2}{dt^2} y(t) + \frac{d}{dt} y(t) + y(t) = \cos(w\,t) \tag{1}$$

```
> # Solve the DE:
  Y1:=rhs(dsolve(Eqn1,y(t)));
```

$$Y1 := e^{-\frac{1}{2} t} \sin\left(\frac{1}{2}\sqrt{3}\, t\right) \_C2 + e^{-\frac{1}{2} t} \cos\left(\frac{1}{2}\sqrt{3}\, t\right) \_C1 + \frac{-\cos(w\,t)\, w^2 + \sin(w\,t)\, w + \cos(w\,t)}{w^4 - w^2 + 1} \tag{2}$$

```
> # Find the amplitude of the particular part of the solution.
  A:=coeff(Y1,cos(w*t)); B:=coeff(Y1,sin(w*t));
```

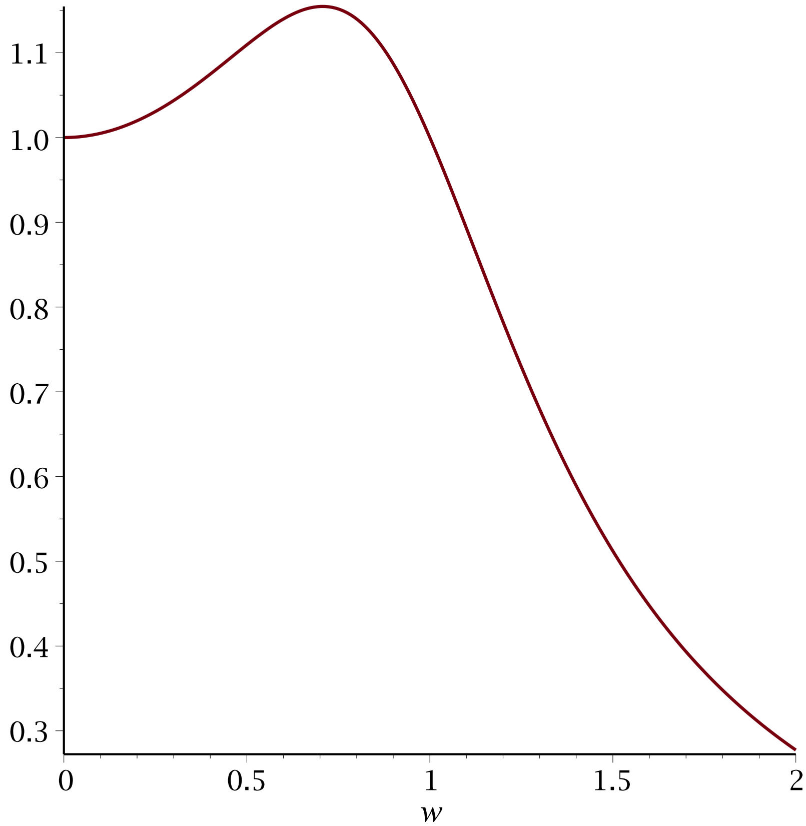
$$A := \frac{-w^2 + 1}{w^4 - w^2 + 1}$$

$$B := \frac{w}{w^4 - w^2 + 1} \tag{3}$$

```
> R:=simplify(sqrt(A^2+B^2));
  # Plot the amplitude as a function of omega:
```

$$R := \sqrt{\frac{1}{w^4 - w^2 + 1}} \tag{4}$$

```
> plot(R,w=0..2);
```




```
> # We see that the maximum amplitude comes when w is a little
  smaller than 1
> # Find the w that gives the maximum by setting the derivative of
  R to zero:
> ws:=solve(diff(R,w)=0,w);
```

$$ws := 0, \frac{1}{2}\sqrt{2}, -\frac{1}{2}\sqrt{2} \quad (5)$$

```
> evalf(ws[2]);
```

$$0.7071067810 \quad (6)$$