Here is a worksheet on problem number 16, section 2.3, page 146: Find the minimum distance from the graph of 
y=x^3+x^2+6 to the point (1,2).

First we'll graph y=x^3+x^2+6 and the point (1,2). The window [-5,5] x [-2, 10] gives a complete graph (other windows do also):

```maple
> with(plots):
> ygraph:=plot(x^3+x^2+6,x=-5..5,y=-2..10,thickness=3, scaling=CONSTRAINED):
> pt:=pointplot({[1,2],[1.01,2]}, connect=true, thickness=6):
> display(ygraph,pt);
```

Now we'll plot the distance from the curve y=x^3+x^2+6 to the point (1,2). This distance is simply the distance from (x, y=x^3+x^2+6) to (1,2) or

$$\sqrt{(x-1)^2 + (x^3+x^2+6-2)^2}$$

```maple
> plot(sqrt((x-1)^2+(x^3+x^2+6-2)^2),x=-5..5,y=-2..10,thickness=3,scaling=CONSTRAINED,title="Distance from point to 
```
You can see that the smallest value of this distance occurs when $x$ is about $-2$ and the smallest distance from the point to the curve is about $3$. You can use your calculator's built-in minimization function to get a better approximation to the smallest distance.

```maple
graph := plot(x^3+x^2+6, x=-5..5, y=-2..10, scaling=CONSTRAINED); pt := pointplot([[1,2],[1.01,2]], connect=true, thickness=6); circlegraph := implicitplot((x-1)^2+(y-2)^2=2.975352652^2, x=-5..5, y=-2..10, color=blue): display(ygraph, pt, circlegraph);```

Here is a plot of the graph of $y=x^3+x^2+6$, the point $(1,2)$, and the circle of radius approximately $2.97535$ which shows that this is the smallest distance from the point to the graph.
If we try to find a point on the graph of $y=x^3+x^2+6$ that's closer to (1,2) than this we will fail as we can see by shrinking the radius of the blue circle:

```plaintext
> ygraph:=plot(x^3+x^2+6,x=-5..5,y=-2..10,scaling=CONSTRAINED):
pt:=pointplot([[1,2],[1.01,2]],connect=true, thickness=6):
circlegraph:=implicitplot((x-1)^2+(y-2)^2=2.90000^2,x=-5..5,
y=-2..10,color=blue):
display(ygraph,pt,circlegraph);
```