Illustration of Theorem 2, Part 3, p. 102

Part 3 of Theorem 2 on p. 102 says that if

$\lim_{x \to a} g(x) = l$ and $l \neq 0$, then $\lim_{x \to a} \frac{1}{g(x)} = \frac{1}{l}$.

In words, succinctly and casually, “the limit of the inverse is the inverse of the limit.”

Let’s illustrate the theorem with a specific example.

The Function

In[215]:=

```
g[x_] := Cos[x]
```

In[216]:=

```
a = Pi/3;
```

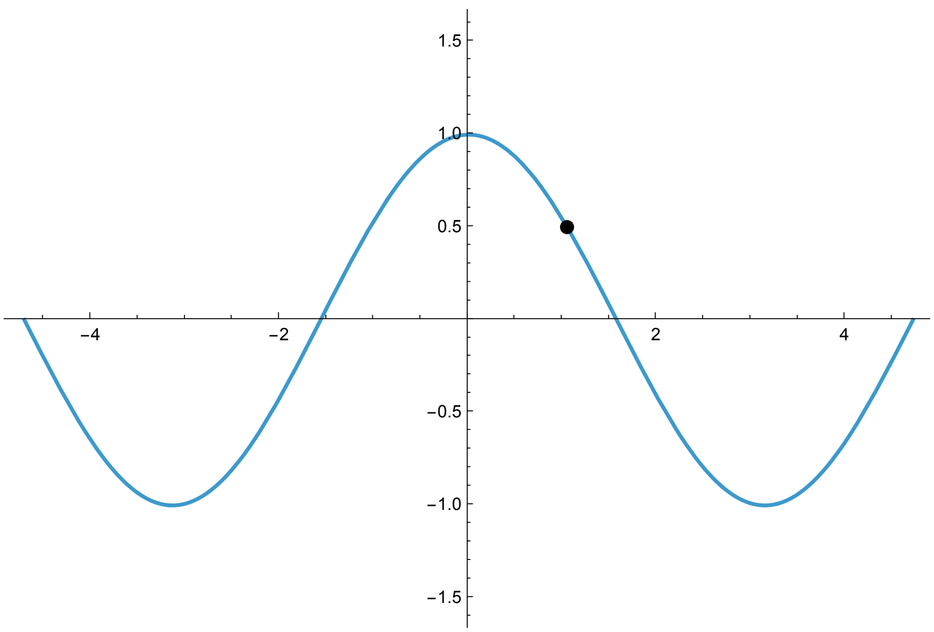
In[217]:=

```
plot = Plot[g[x], {x, -3 Pi/2, 3 Pi/2}, AspectRatio → 2 / 3];
point = Point[{a, g[a]}];
```

In[219]:=

```
Show[plot, Graphics[Style[point, PointSize[0.015]]], PlotRange → {-1.5, 1.5}]
```

Out[219]=



The Inverse Function

In[220]:=

```
gInverse[x_] := If[g[x] == 0, 1000, 1/g[x]]
```

In[221]:=

```
plot2 = Plot[gInverse[x], {x, -3 Pi/2, 3 Pi/2}, AspectRatio → 4 / 3];
point2 = Point[{a, gInverse[a]}];
```

In[223]:=

```
Show[plot2, Graphics[Style[point2, PointSize[0.015]]], PlotRange → {-3, 3}]
```

Out[223]=