A function with fixed points for which fixed-point iterations do not converge.

```
f:=x->1-x^2;
```

$$f := x \to 1 - x^2 \tag{1}$$

```
> solve({1-x^2=x},{x});
```

$$\left\{x = -\frac{1}{2} - \frac{1}{2}\sqrt{5}\right\}, \left\{x = -\frac{1}{2} + \frac{1}{2}\sqrt{5}\right\} \tag{2}$$

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

$$\{x = -1.618033988\}, \{x = 0.6180339880\} \tag{3}$$

```
> p0:=0.618;
```

$$p0 := 0.618 \tag{4}$$

```
> for n from 1 to 60 do
  p:=f(p0);
  err:=abs(p-p0);
  if err>=10^(-5) then
  p0:=p;
  else
  break
  end if;
  end do;
```

$$p := 0.618076$$
$$err := 0.000076$$
$$p := 0.6179820582$$
$$err := 0.0000939418$$
$$p := 0.6180981757$$
$$err := 0.0001161175$$
$$p := 0.6179546452$$
$$err := 0.0001435305$$
$$p := 0.6181320565$$
$$err := 0.0001774113$$
$$p := 0.6179127607$$
$$err := 0.0002192958$$
$$p := 0.6181838202$$
$$err := 0.0002710595$$
$$p := 0.6178487644$$
$$err := 0.0003350558$$
$$p := 0.6182629043$$
$$err := 0.0004141399$$
$$p := 0.6177509812$$
$$err := 0.0005119231$$
$$p := 0.6183837252$$
$$err := 0.0006327440$$

$p := 0.6176015684$
$err := 0.0007821568$
$p := 0.6185683027$
$err := 0.0009667343$
$p := 0.6173732549$
$err := 0.0011950478$
$p := 0.6188502641$
$err := 0.0014770092$
$p := 0.6170243506$
$err := 0.0018259135$
$p := 0.6192809508$
$err := 0.0022566002$
$p := 0.6164911040$
$err := 0.0027898468$
$p := 0.6199387187$
$err := 0.0034476147$
$p := 0.6156759851$
$err := 0.0042627336$
$p := 0.6209430814$
$err := 0.0052670963$
$p := 0.6144296897$
$err := 0.0065133917$
$p := 0.6224761564$
$err := 0.0080464667$
$p := 0.6125234347$
$err := 0.0099527217$
$p := 0.6248150419$
$err := 0.0122916072$
$p := 0.6096061634$
$err := 0.0152088785$
$p := 0.6283803255$
$err := 0.0187741621$
$p := 0.6051381665$
$err := 0.0232421590$
$p := 0.6338077994$
$err := 0.0286696329$
$p := 0.5982876734$
$err := 0.0355201260$
$p := 0.6420518599$
$err := 0.0437641865$
$p := 0.5877694092$
$err := 0.0542824507$
$p := 0.6545271216$
$err := 0.0667577124$
$p := 0.5715942471$
$err := 0.0829328745$
$p := 0.6732800167$
$err := 0.1016857696$

$$p := 0.5466940191$$
$$err := 0.1265859976$$
$$p := 0.7011256495$$
$$err := 0.1544316304$$
$$p := 0.5084228236$$
$$err := 0.1927028259$$
$$p := 0.7415062324$$
$$err := 0.2330834088$$
$$p := 0.4501685073$$
$$err := 0.2913377251$$
$$p := 0.7973483150$$
$$err := 0.3471798077$$
$$p := 0.3642356646$$
$$err := 0.4331126504$$
$$p := 0.8673323806$$
$$err := 0.5030967160$$
$$p := 0.2477345416$$
$$err := 0.6195978390$$
$$p := 0.9386275969$$
$$err := 0.6908930553$$
$$p := 0.1189782343$$
$$err := 0.8196493626$$
$$p := 0.9858441798$$
$$err := 0.8668659455$$
$$p := 0.0281112532$$
$$err := 0.9577329266$$
$$p := 0.9992097574$$
$$err := 0.9710985042$$
$$p := 0.0015798607$$
$$err := 0.9976298967$$
$$p := 0.9999975040$$
$$err := 0.9984176433$$
$$p := 0.0000049920$$
$$err := 0.9999925120$$
$$p := 1.000000000$$
$$err := 0.9999950080$$
$$p := 0.$$
$$err := 1.000000000$$
$$p := 1.$$
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$$p := 0.$$
$$err := 1. \tag{5}$$