Equation Grapher (Concept)

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[ ]:
```
from sympy import Symbol, Eq, solve
from numpy import linspace
from sympy.parsing.sympy_parser import parse_expr as parse
from matplotlib.pyplot import scatter
```

1 Inputting equation

[ ]:
```
equation = input("Enter equation: ")
v = ["x", "y"] # Dependent variables (always same)
params = [] # Independent parameters (any alphabet except x and y)
#------------------------
# Identifying parameters
for c in equation:
    if c.isalpha() and c not in v:
        params.append(c)
#------------------------
equation = equation.split("=")
lhs, rhs = parse(equation[0].strip()), parse(equation[1].strip())
equation = Eq(lhs, rhs)
equation
# '.strip' removes leading and trailing spaces
```

```
Enter equation: x**2/a**2-y**2/b**2=1
```

[ ]:
$$-\frac{y^2}{b^2}+\frac{x^2}{a^2}=1$$

2 Inputting parameter values

[ ]:
```
specific = equation
for i in params:
    value = input(i + ": ")
    specific = specific.subs({Symbol(i):value})
specific
```

```
a: 2
b: 3
```

[ ]: $$\frac{x^2}{4} - \frac{y^2}{9} = 1$$

3 Creating plot

[ ]:
```
domain = linspace(-10, 10, 100)
x, y = [], []
for i in domain:
    tmp = specific.subs({Symbol(v[0]):i})
    solutions = list(solve(tmp, Symbol(v[1])))
    for s in solutions:
        try:
            s = float(s)
            x.append(i)
            y.append(s)
        except: pass
```

[ ]:
```
scatter(x, y)
None
```