Load Packages

Forward Mode Automatic Differentiation

```
1 md"# Forward Mode Automatic Differentiation"
```

```
1 using ForwardDiff, Plots, PlutoUI
```

Define Function

```
f (generic function with 1 method)
```

x: -0.02

```
y = 0.019992
```

Find Derivative

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

where x is a fixed value of the function $f(x)$ and h is a number close to zero.

```
dydx = -0.9988
```

$$y = mx + b$$

where m is the slope and b is the y-intercept

```
b = 1.5999999999998654e-5
```

```
b = y - slope * x
```

```
x_left = -1.02
```

```
x_left = x -1
```

```
x_right = 0.98
```

```
x_right = x + 1
```

```
y_left = 1.0187920000000001
```

```
y_left = slope * x_left + b
```

```
y_right = -0.978808
```

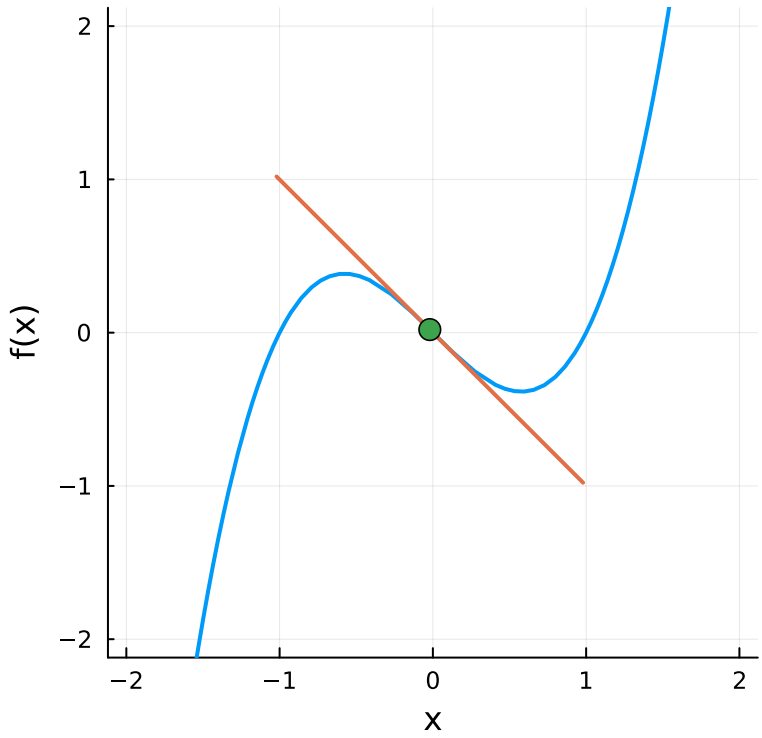
```
y_right = slope * x_right + b
```

Control Planel

```
md"## Control Planel"
```

x: -0.02 | f(x): 0.019992 | f'(x): -0.9988

```
md"""
x: $(x) | f(x): $(y) | f'(x): $(dydx)
"""
```




```
begin
    #plot f(x)
plot(f,
    linewidth = 2,
    legend = false,
    title = "Relationship between x, f(x) and f'(x)",
    xaxis = "x",
    yaxis = "f(x)",
    formatter = :plain,
    widen = true,
    xlims =(-2, 2),
    ylims = (-2, 2),
    aspect_ratio = 1
)
    #plot tangent line
plot!([x_left, x_right], [y_left, y_right], linewidth = 2)
    #plot x-y point
    scatter!((x,y), markersize = 6)
end
```