

fplot_deriv.R

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```
# fplot_deriv.R
# Plot a function and its derivative

# Load necessary libraries
library(ggplot2)

# Minimum and maximum values of x
xmin <- -5
xmax <- 5

# Divisions between xmin and xmax (more = smoother graph)
xdiv <- 100

# Step size
xstep <- (xmax-xmin)/xdiv

# Find x values for the plot
x <- seq(xmin,xmax,xstep)

# Insert y = f(x) and dy/dx formulas here
# Quadratic function
y <- -x^2 + 2*x + 5
dydx <- -2*x + 2

# Make data frame for ggplot2
plotdata <- as.data.frame(cbind(x,y,dydx))

# Print data
plotdata
```

```
##      x      y dydx
## 1 -5.0 -30.00 12.0
## 2 -4.9 -28.81 11.8
## 3 -4.8 -27.64 11.6
## 4 -4.7 -26.49 11.4
## 5 -4.6 -25.36 11.2
## 6 -4.5 -24.25 11.0
## 7 -4.4 -23.16 10.8
## 8 -4.3 -22.09 10.6
## 9 -4.2 -21.04 10.4
## 10 -4.1 -20.01 10.2
## 11 -4.0 -19.00 10.0
## 12 -3.9 -18.01  9.8
## 13 -3.8 -17.04  9.6
## 14 -3.7 -16.09  9.4
## 15 -3.6 -15.16  9.2
## 16 -3.5 -14.25  9.0
```

## 17	-3.4	-13.36	8.8
## 18	-3.3	-12.49	8.6
## 19	-3.2	-11.64	8.4
## 20	-3.1	-10.81	8.2
## 21	-3.0	-10.00	8.0
## 22	-2.9	-9.21	7.8
## 23	-2.8	-8.44	7.6
## 24	-2.7	-7.69	7.4
## 25	-2.6	-6.96	7.2
## 26	-2.5	-6.25	7.0
## 27	-2.4	-5.56	6.8
## 28	-2.3	-4.89	6.6
## 29	-2.2	-4.24	6.4
## 30	-2.1	-3.61	6.2
## 31	-2.0	-3.00	6.0
## 32	-1.9	-2.41	5.8
## 33	-1.8	-1.84	5.6
## 34	-1.7	-1.29	5.4
## 35	-1.6	-0.76	5.2
## 36	-1.5	-0.25	5.0
## 37	-1.4	0.24	4.8
## 38	-1.3	0.71	4.6
## 39	-1.2	1.16	4.4
## 40	-1.1	1.59	4.2
## 41	-1.0	2.00	4.0
## 42	-0.9	2.39	3.8
## 43	-0.8	2.76	3.6
## 44	-0.7	3.11	3.4
## 45	-0.6	3.44	3.2
## 46	-0.5	3.75	3.0
## 47	-0.4	4.04	2.8
## 48	-0.3	4.31	2.6
## 49	-0.2	4.56	2.4
## 50	-0.1	4.79	2.2
## 51	0.0	5.00	2.0
## 52	0.1	5.19	1.8
## 53	0.2	5.36	1.6
## 54	0.3	5.51	1.4
## 55	0.4	5.64	1.2
## 56	0.5	5.75	1.0
## 57	0.6	5.84	0.8
## 58	0.7	5.91	0.6
## 59	0.8	5.96	0.4
## 60	0.9	5.99	0.2
## 61	1.0	6.00	0.0
## 62	1.1	5.99	-0.2
## 63	1.2	5.96	-0.4
## 64	1.3	5.91	-0.6
## 65	1.4	5.84	-0.8
## 66	1.5	5.75	-1.0
## 67	1.6	5.64	-1.2
## 68	1.7	5.51	-1.4
## 69	1.8	5.36	-1.6
## 70	1.9	5.19	-1.8

```
## 71  2.0  5.00 -2.0
## 72  2.1  4.79 -2.2
## 73  2.2  4.56 -2.4
## 74  2.3  4.31 -2.6
## 75  2.4  4.04 -2.8
## 76  2.5  3.75 -3.0
## 77  2.6  3.44 -3.2
## 78  2.7  3.11 -3.4
## 79  2.8  2.76 -3.6
## 80  2.9  2.39 -3.8
## 81  3.0  2.00 -4.0
## 82  3.1  1.59 -4.2
## 83  3.2  1.16 -4.4
## 84  3.3  0.71 -4.6
## 85  3.4  0.24 -4.8
## 86  3.5 -0.25 -5.0
## 87  3.6 -0.76 -5.2
## 88  3.7 -1.29 -5.4
## 89  3.8 -1.84 -5.6
## 90  3.9 -2.41 -5.8
## 91  4.0 -3.00 -6.0
## 92  4.1 -3.61 -6.2
## 93  4.2 -4.24 -6.4
## 94  4.3 -4.89 -6.6
## 95  4.4 -5.56 -6.8
## 96  4.5 -6.25 -7.0
## 97  4.6 -6.96 -7.2
## 98  4.7 -7.69 -7.4
## 99  4.8 -8.44 -7.6
## 100 4.9 -9.21 -7.8
## 101 5.0 -10.00 -8.0
```

```
# Plot the values
ggplot(plotdata,aes(x,y))+
  geom_line(color="red",size=1)+
  geom_line(aes(x,dydx),color="blue",size=1)+
  ggtitle("Plot a function and its derivative - quadratic function")
```

Plot a function and its derivative – quadratic function

