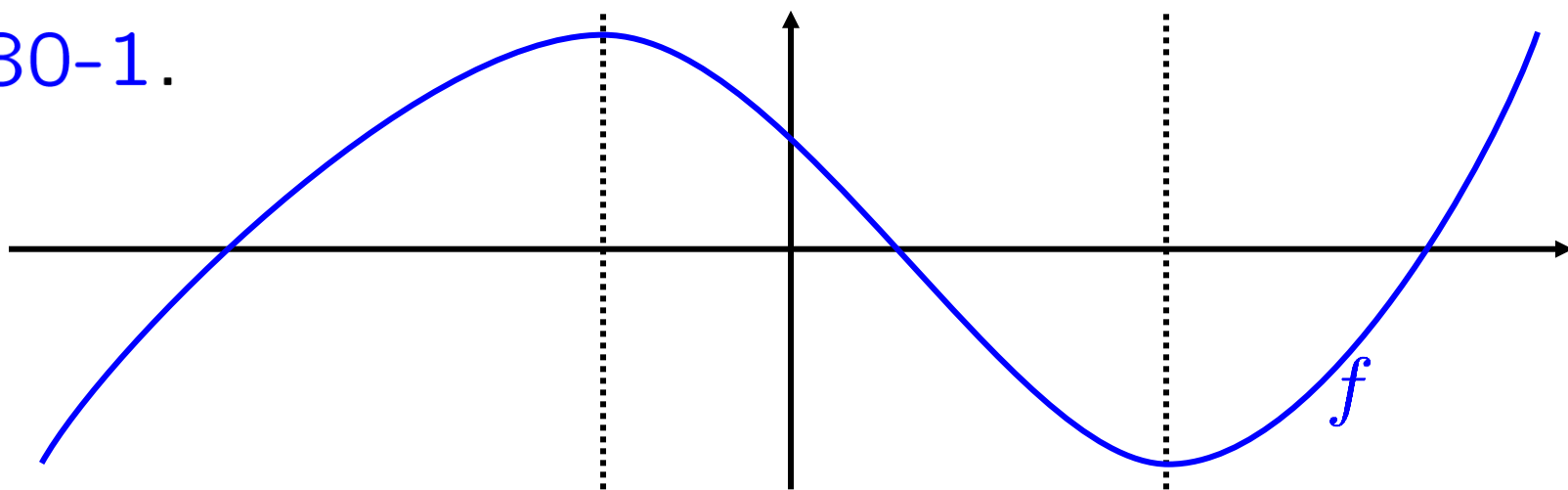


CALCULUS

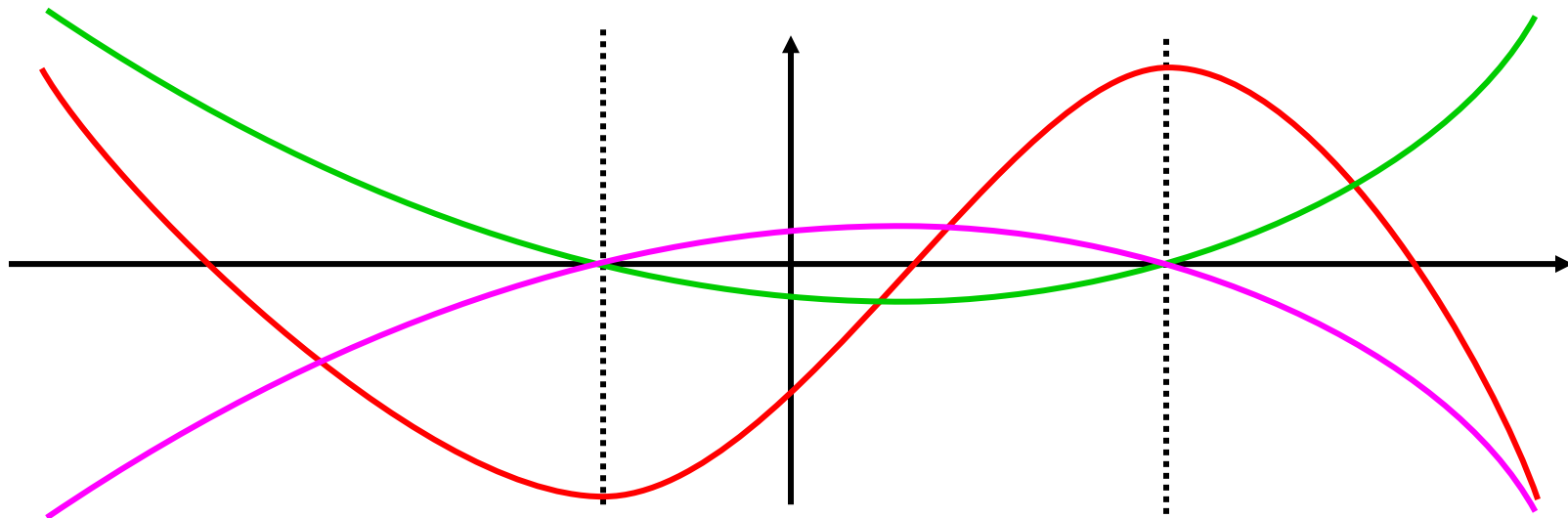
The derivative of a function is a function

OLD

0280-1.
OLD

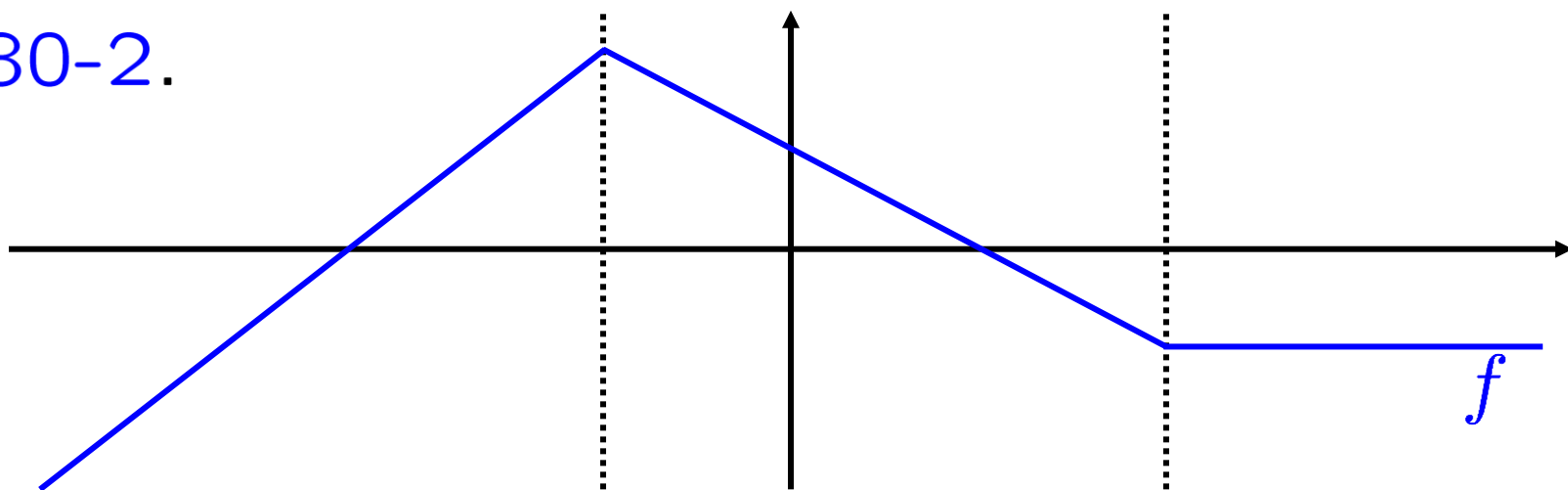


The graph of f is shown above.
Which of the following is the graph of f' ?

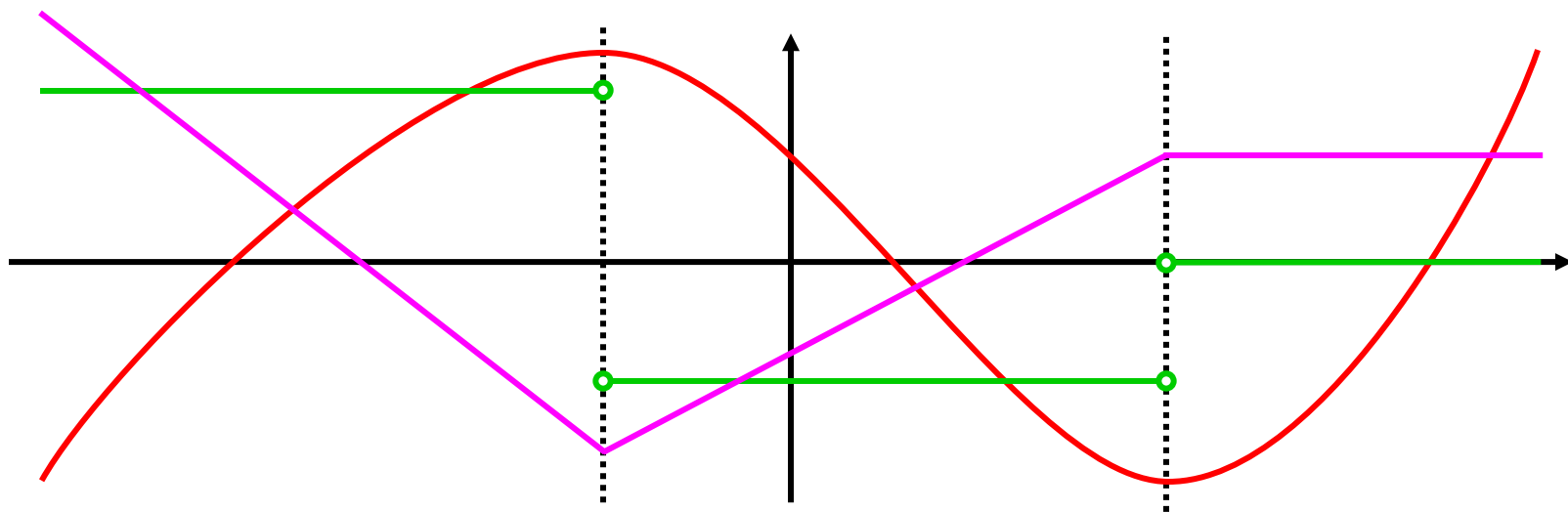


Choose red, green or purple.

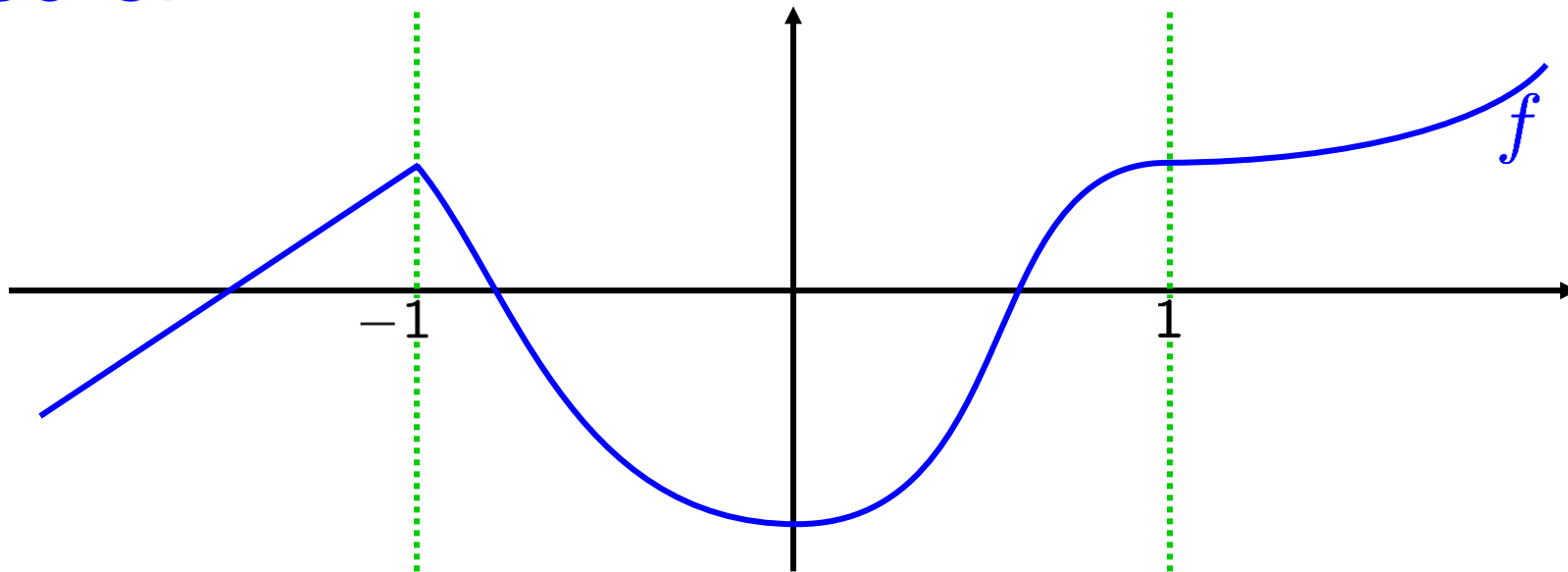
0280-2.
OLD



The graph of f is shown above.
Which of the following is the graph of f' ?



Choose red, green or purple.

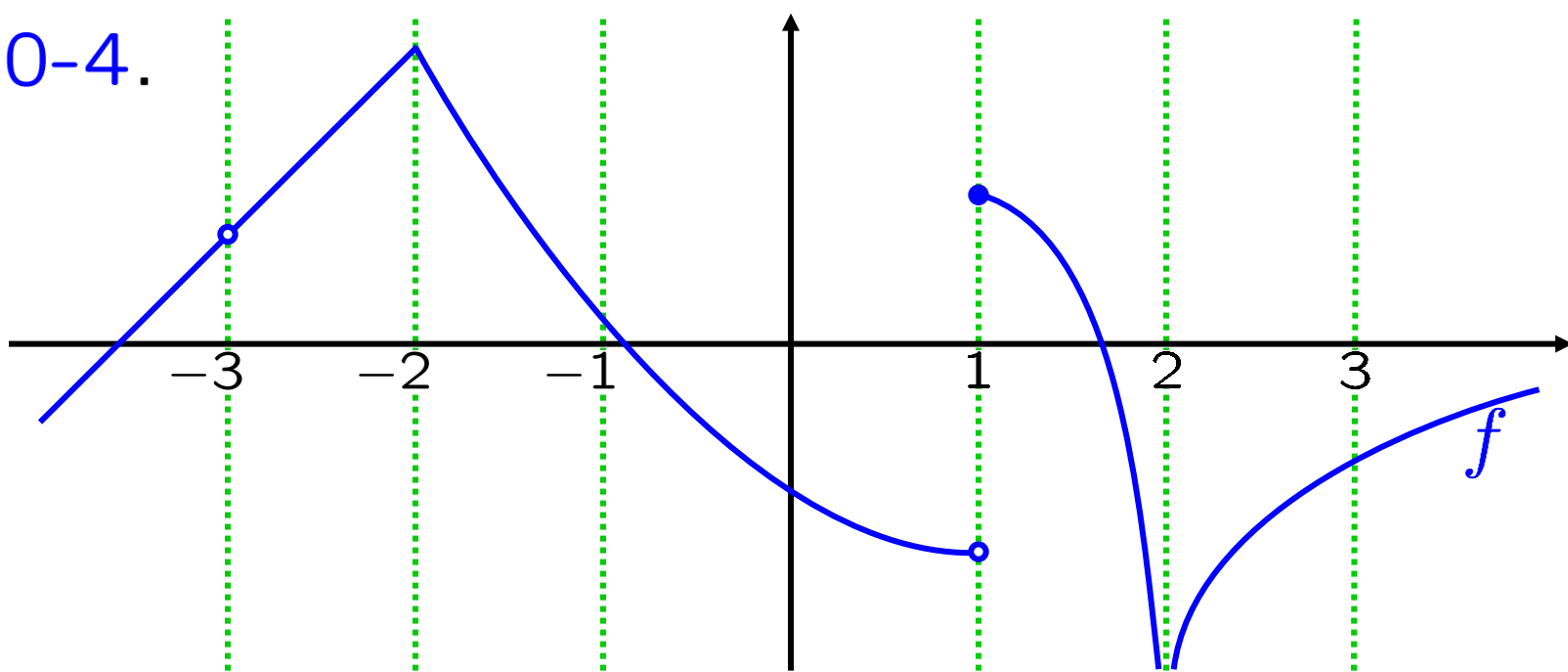


The graph of f is shown above.

Freehand a sketch of the graph of f' .

On your graph, indicate 1 and -1 on
the horizontal axis.

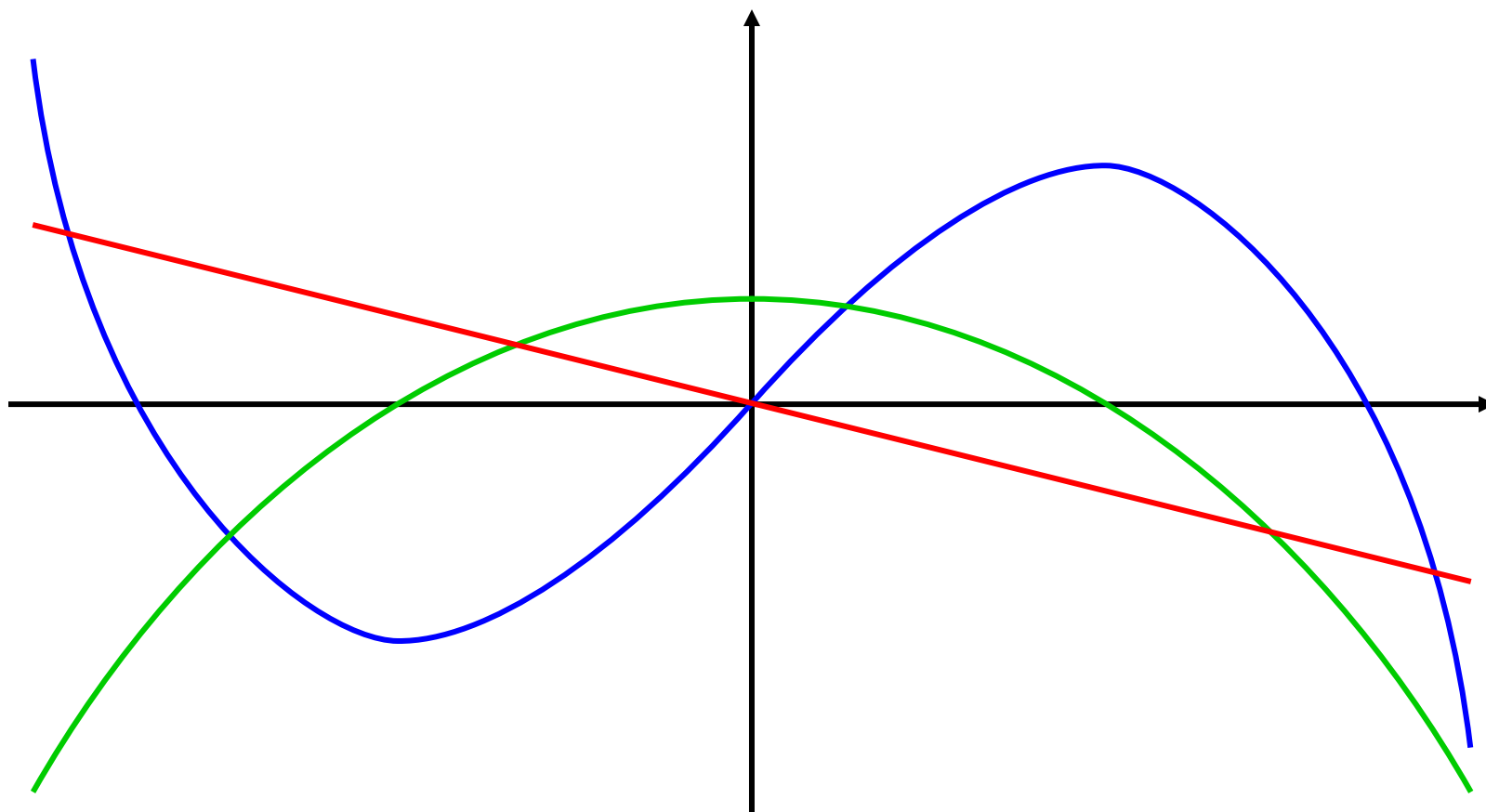
0280-4.
OLD



The graph of f is shown above.

- At **which** of the numbers $-3, -2, -1, 0, 1, 2, 3$ is f **not** defined?
- At **which** of the numbers $-3, -2, -1, 0, 1, 2, 3$ is f **not** continuous?
- At **which** of the numbers $-3, -2, -1, 0, 1, 2, 3$ is f **not** differentiable?

0280-5.
OLD



The graphs of f , f' and f'' are shown above.
Which is which?

State the color of f ,
the color of f' and the color of f'' .

0280-6. Let $f(s) = 7s - 5s^3$.

a. What is the domain of f ?

b. Using the definition of the derivative, and using the cubic binomial formula

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3,$$

compute $f'(s)$.

c. What is the domain of the derivative f' ?

0280-7. OLD Let $f(x) = \frac{1+x}{2+x}$.

- a. What is the domain of f ?
- b. Using the definition of the derivative, compute $f'(x)$.
- c. What is the domain of the derivative f' ?

0280-8. Let $f(x) = |x^2 - 2x - 3|$.

At which numbers is f not differentiable?

Hint: Determine the (maximal) intervals where $x^2 - 2x - 3$ is positive and negative.

Sketch the graph of $y = x^2 - 2x - 3$.

Sketch the graph of $y = f(x)$.

GENERAL RULE:

At numbers x where $x^2 - 2x - 3$ has a root of multiplicity one, f is not differentiable.

Everywhere else, f is differentiable.

0280-9. Let $f(x) = |x^4 - 2x^3 - 3x^2|$.

At which numbers is f not differentiable?

Hint: Determine the (maximal) intervals where $x^4 - 2x^3 - 3x^2$ is positive and negative.

Sketch the graph of $y = x^4 - 2x^3 - 3x^2$.

Sketch the graph of $y = f(x)$.

GENERAL RULE:

At numbers x where $x^4 - 2x^3 - 3x^2$ has a root of multiplicity one, f is not differentiable.

Everywhere else, f is differentiable.