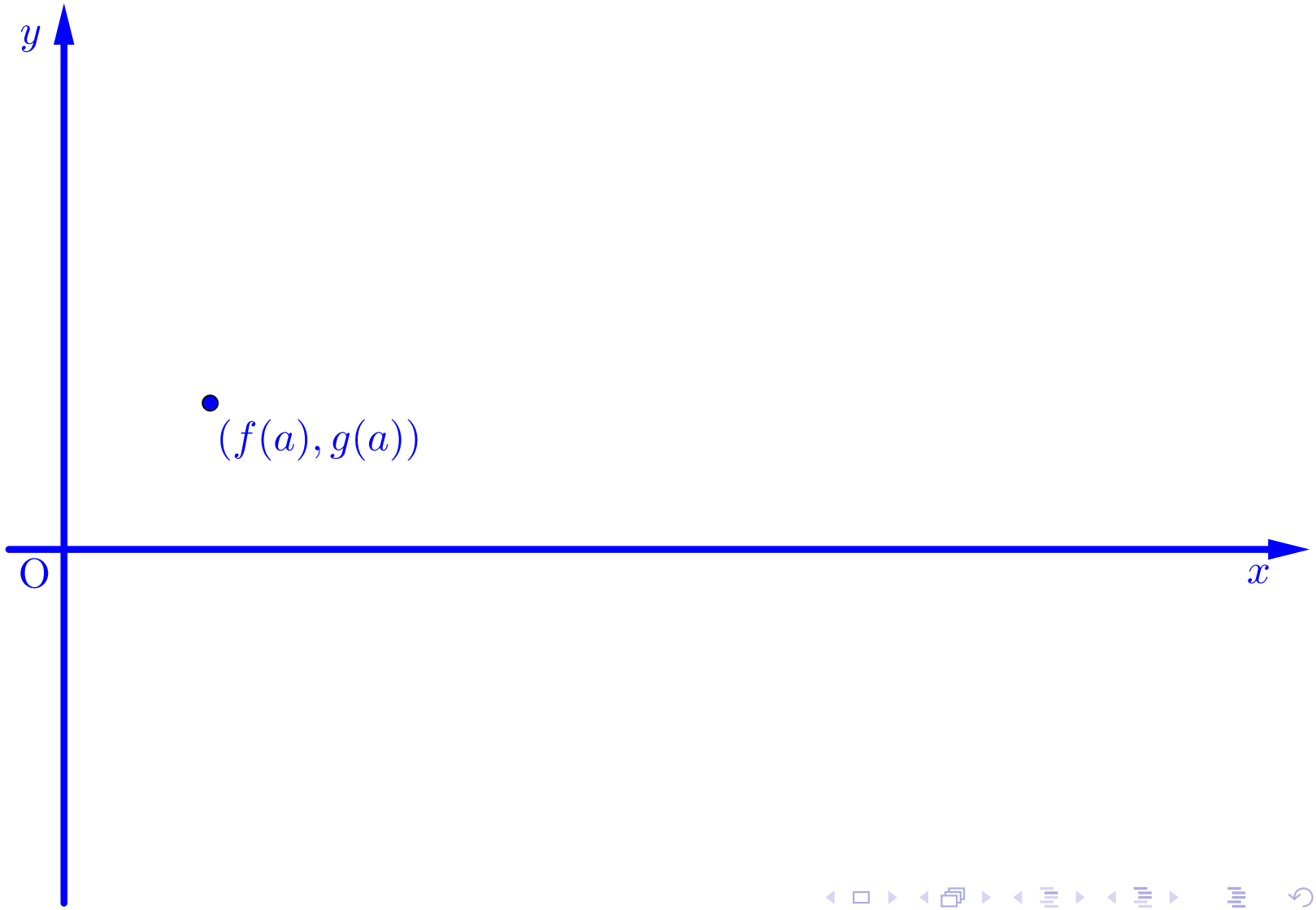
코시의 평균값 정리
(Cauchy's Mean Value Theorem)

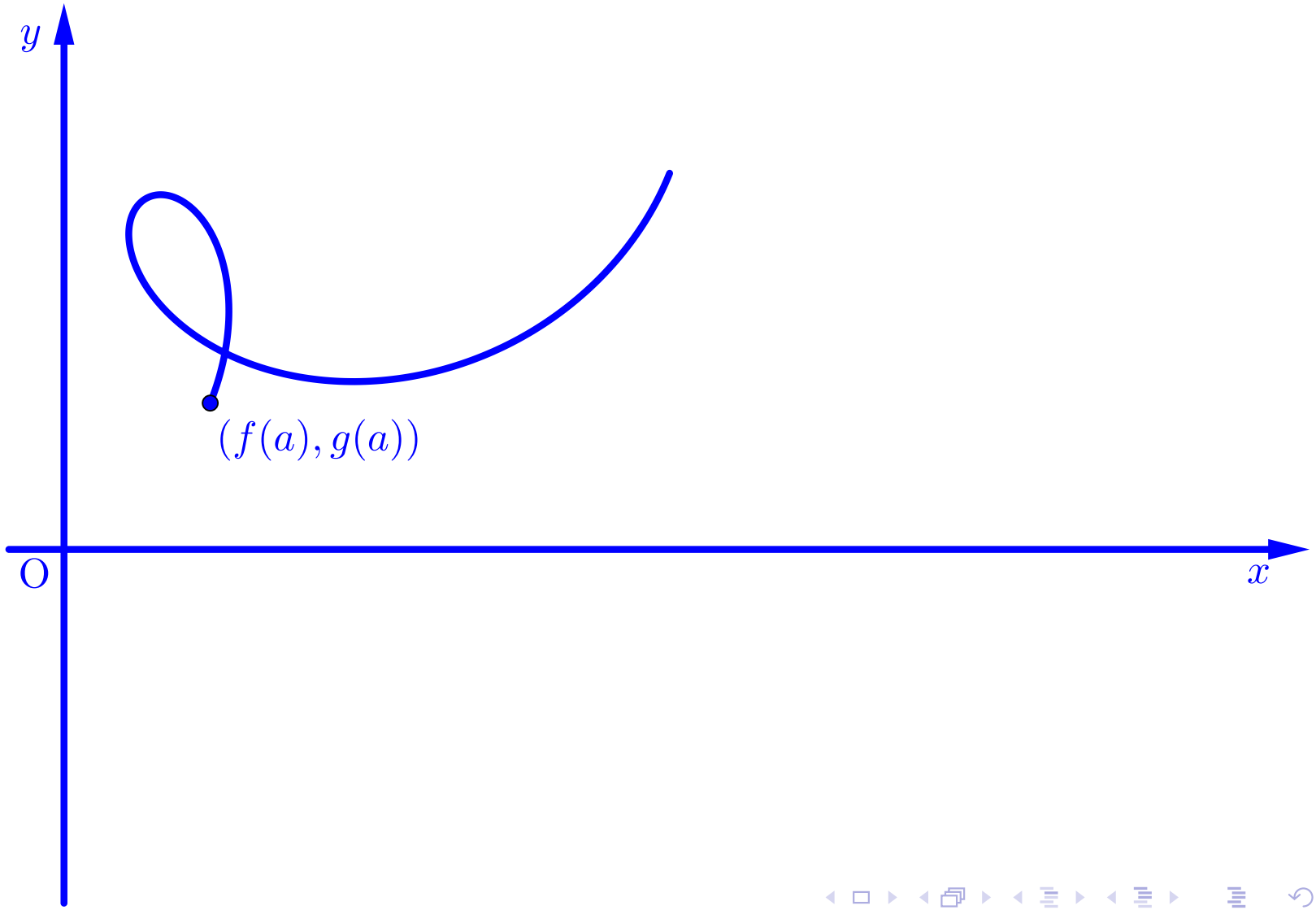
Cauchy's Mean Value Theorem

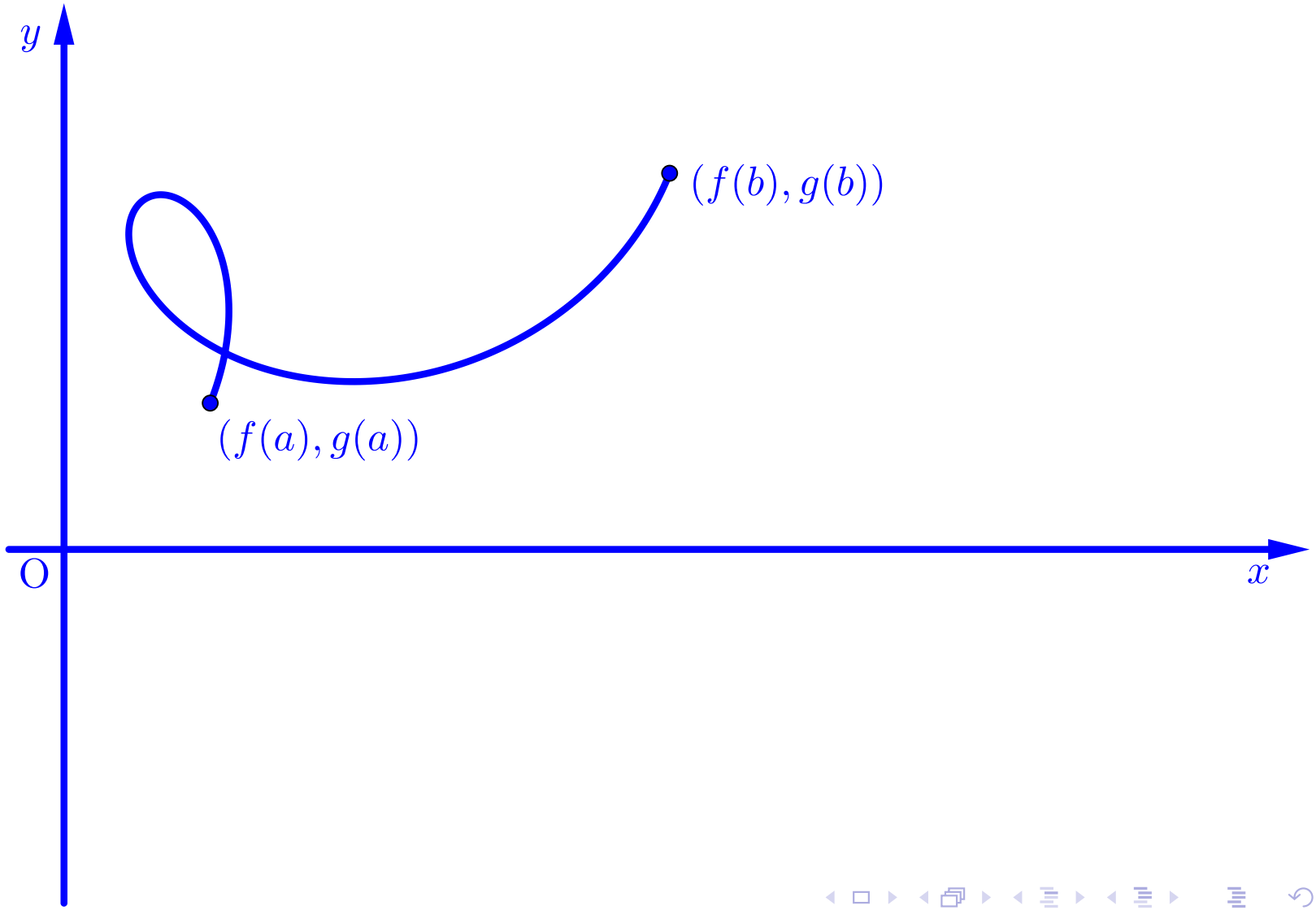
Start End

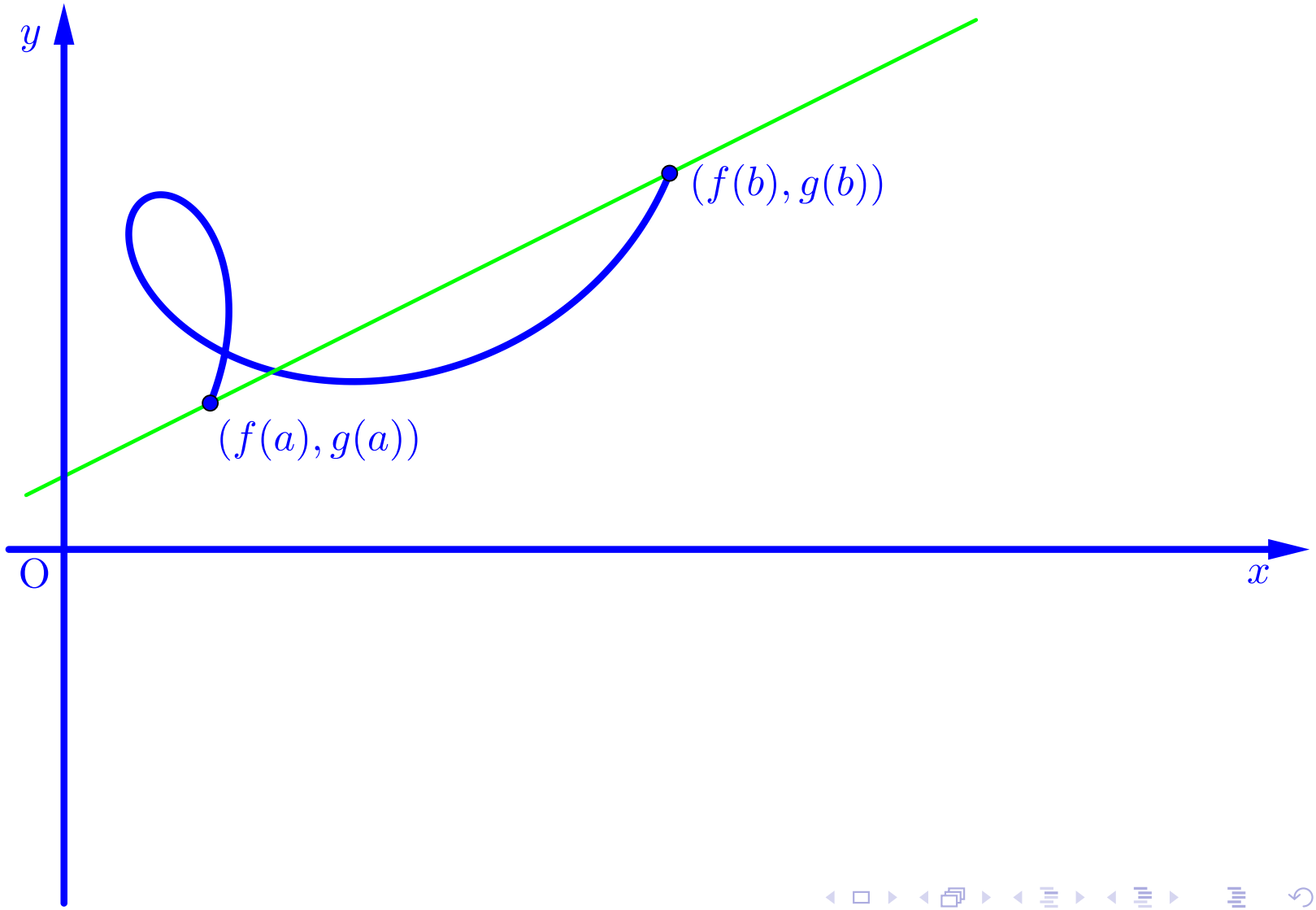
Start End

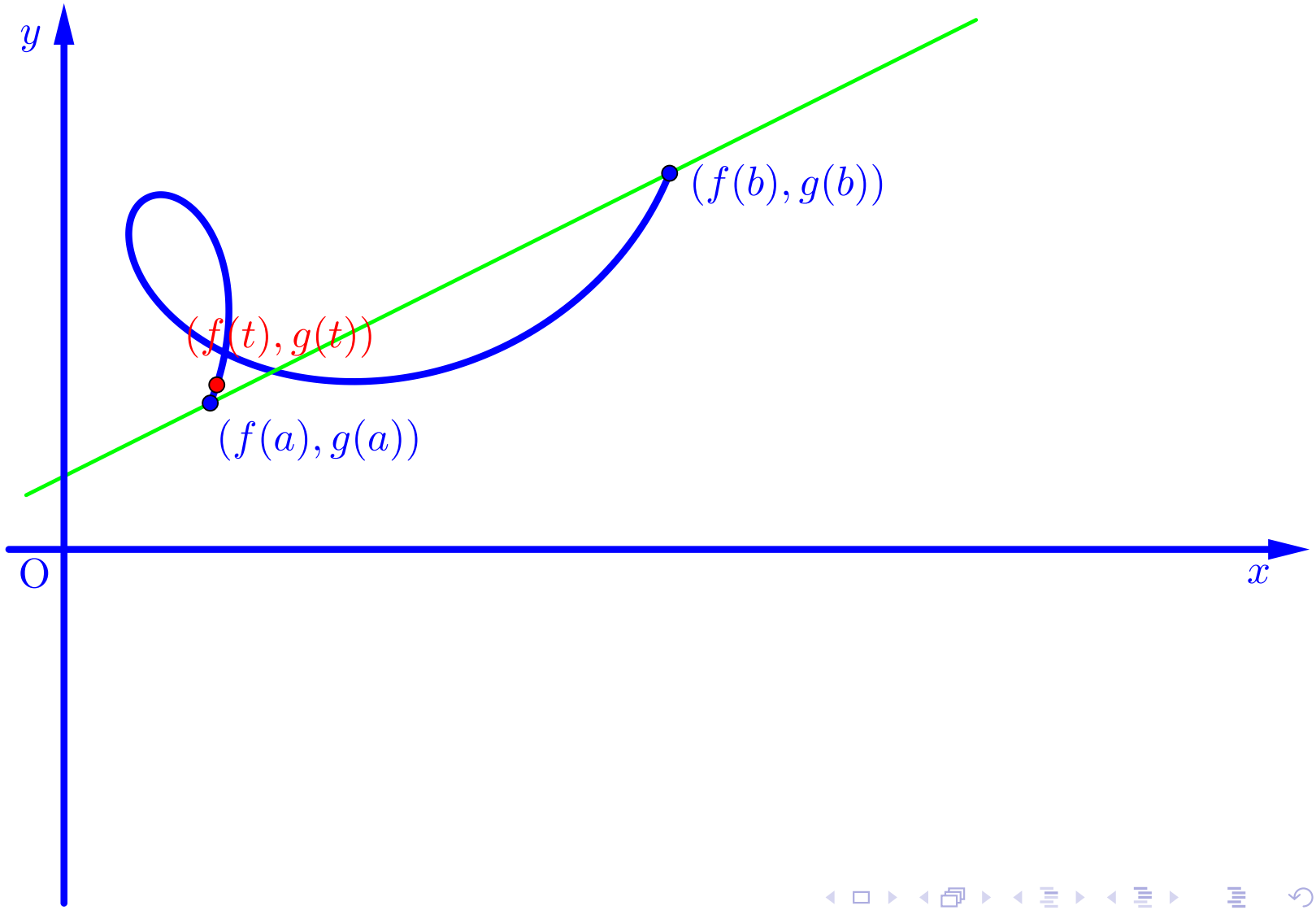
y
O
x

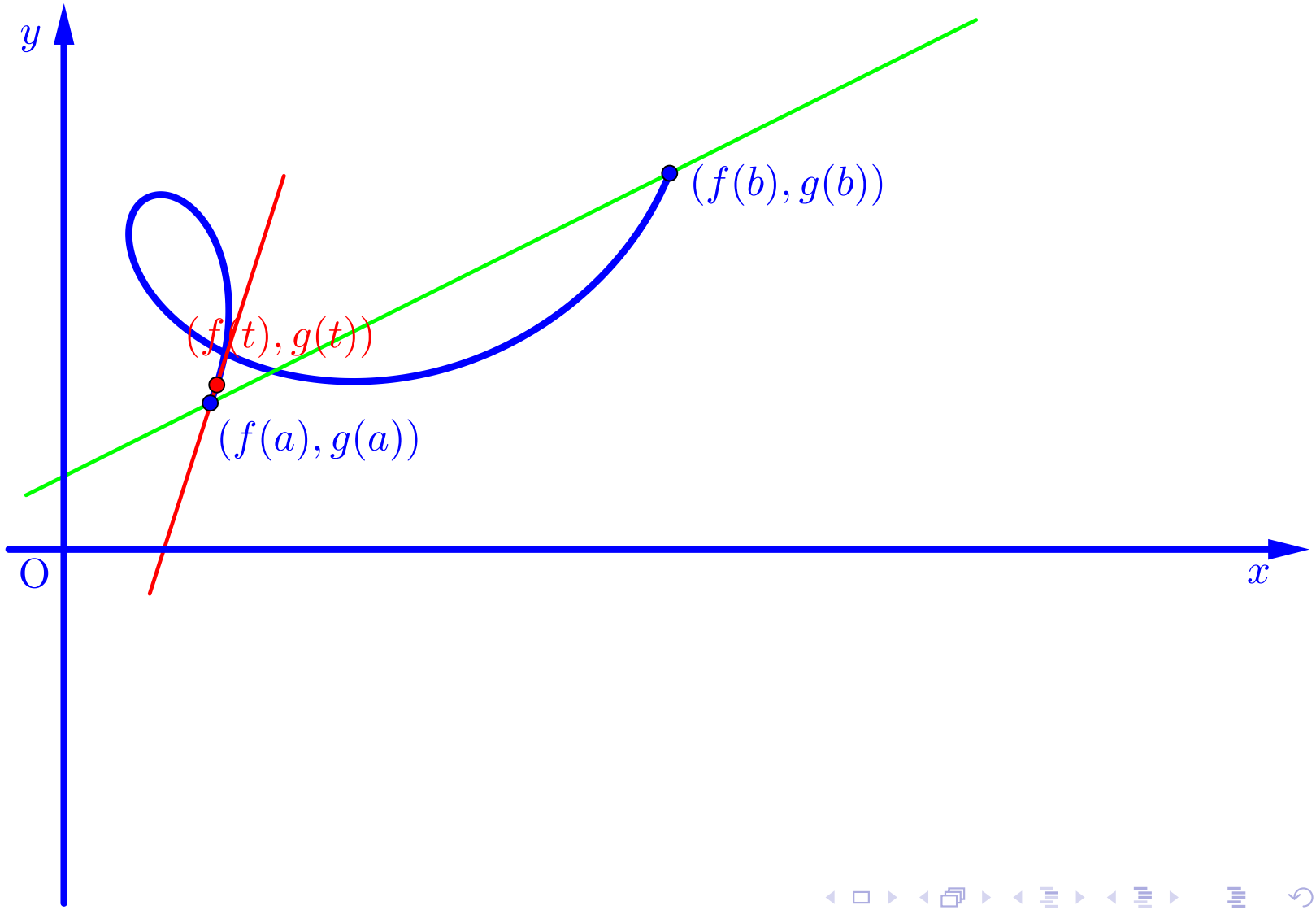

y
(f(a), g(a))
O
x

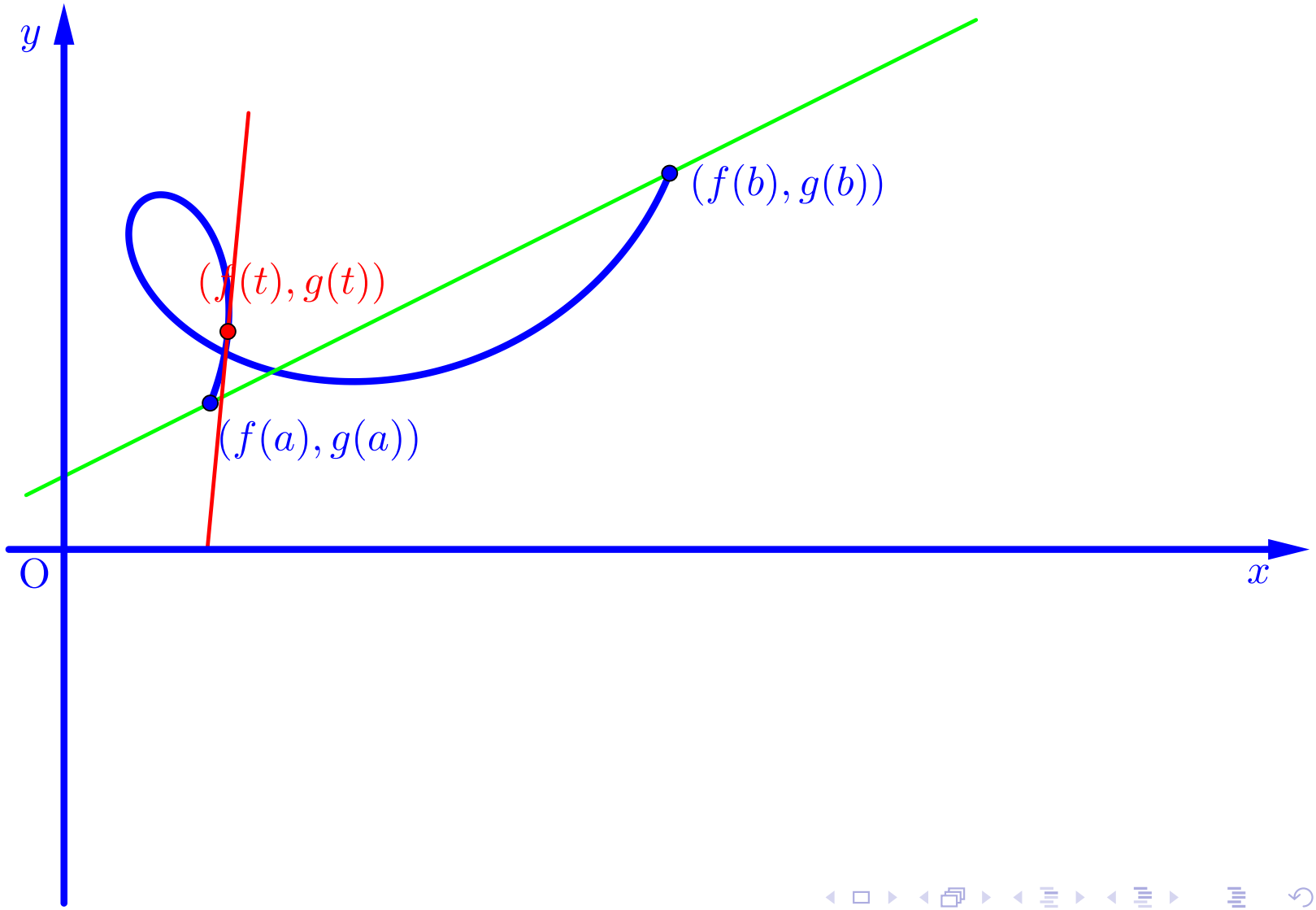

y
x
O
$(f(a), g(a))$

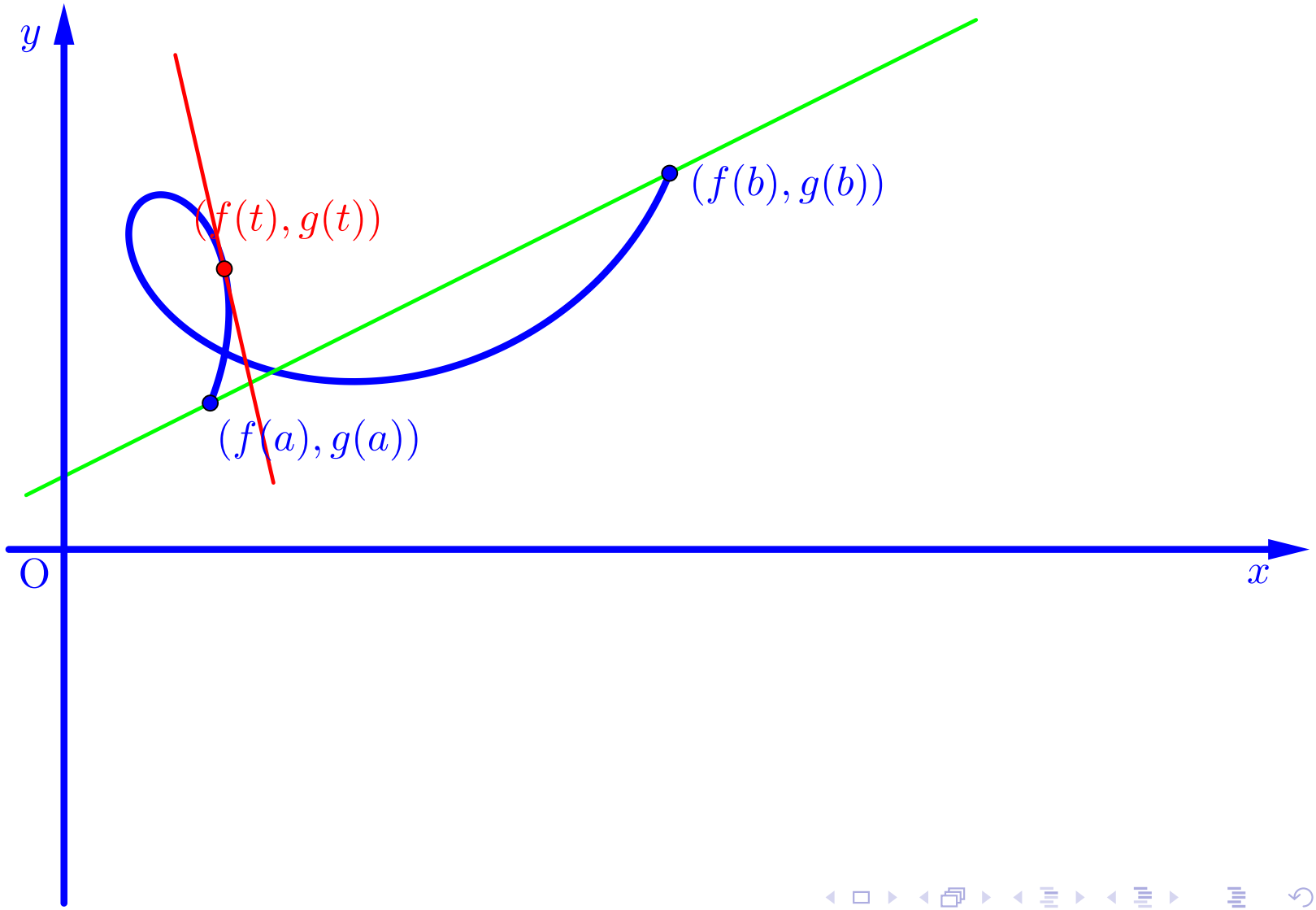

y
(f(b), g(b))
(f(a), g(a))
O
x

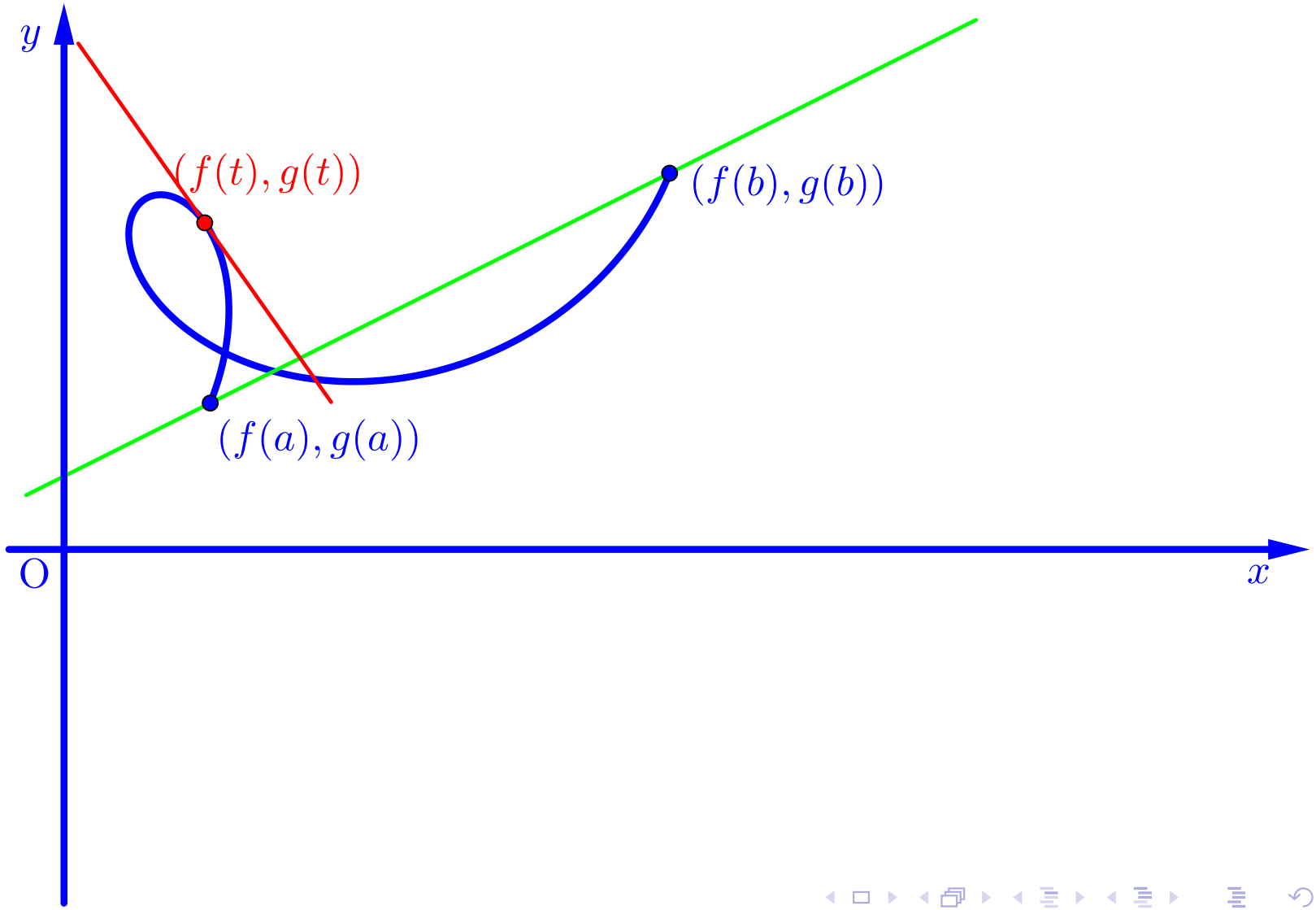

y
x
O
$(f(b), g(b))$
$(f(a), g(a))$

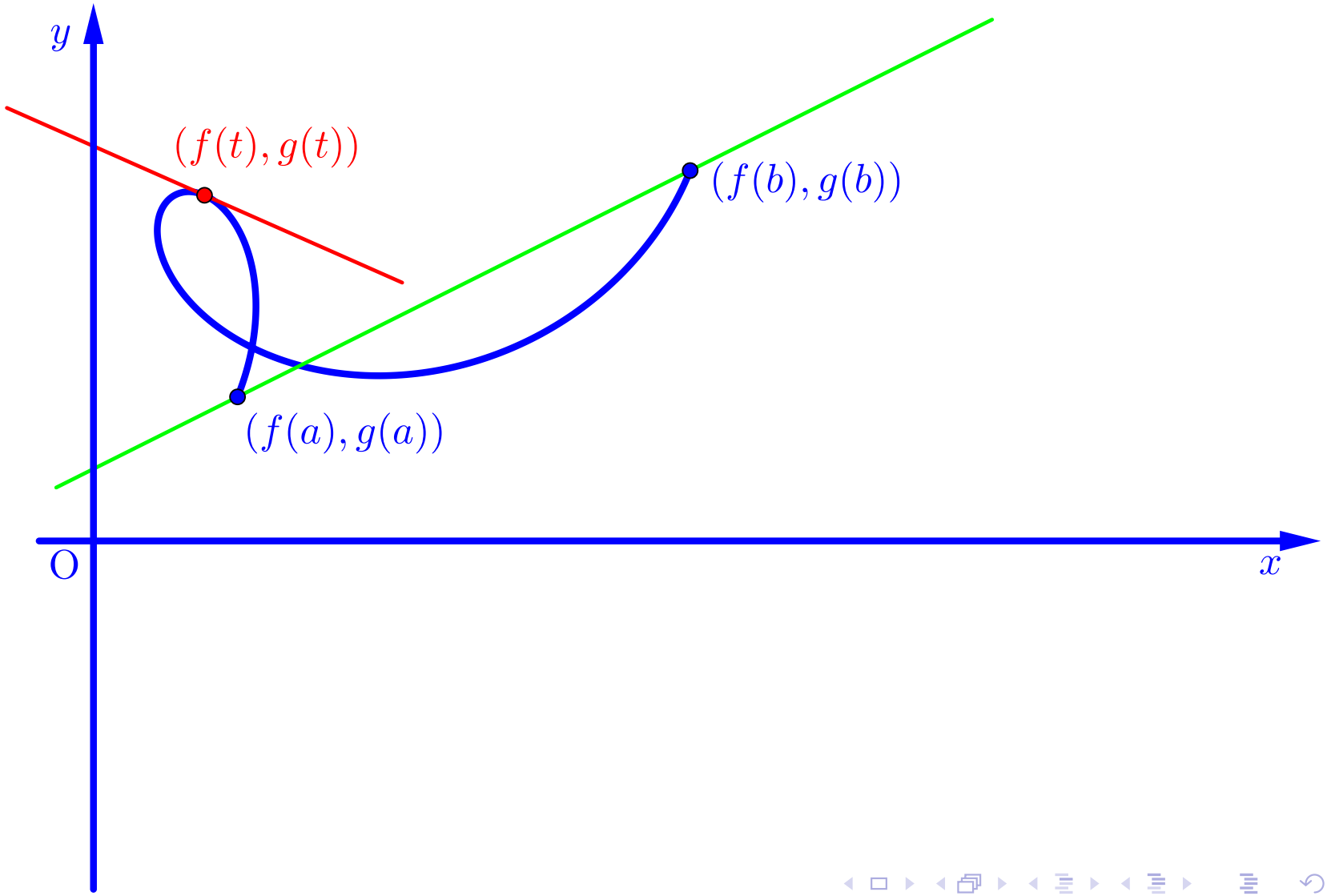

y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

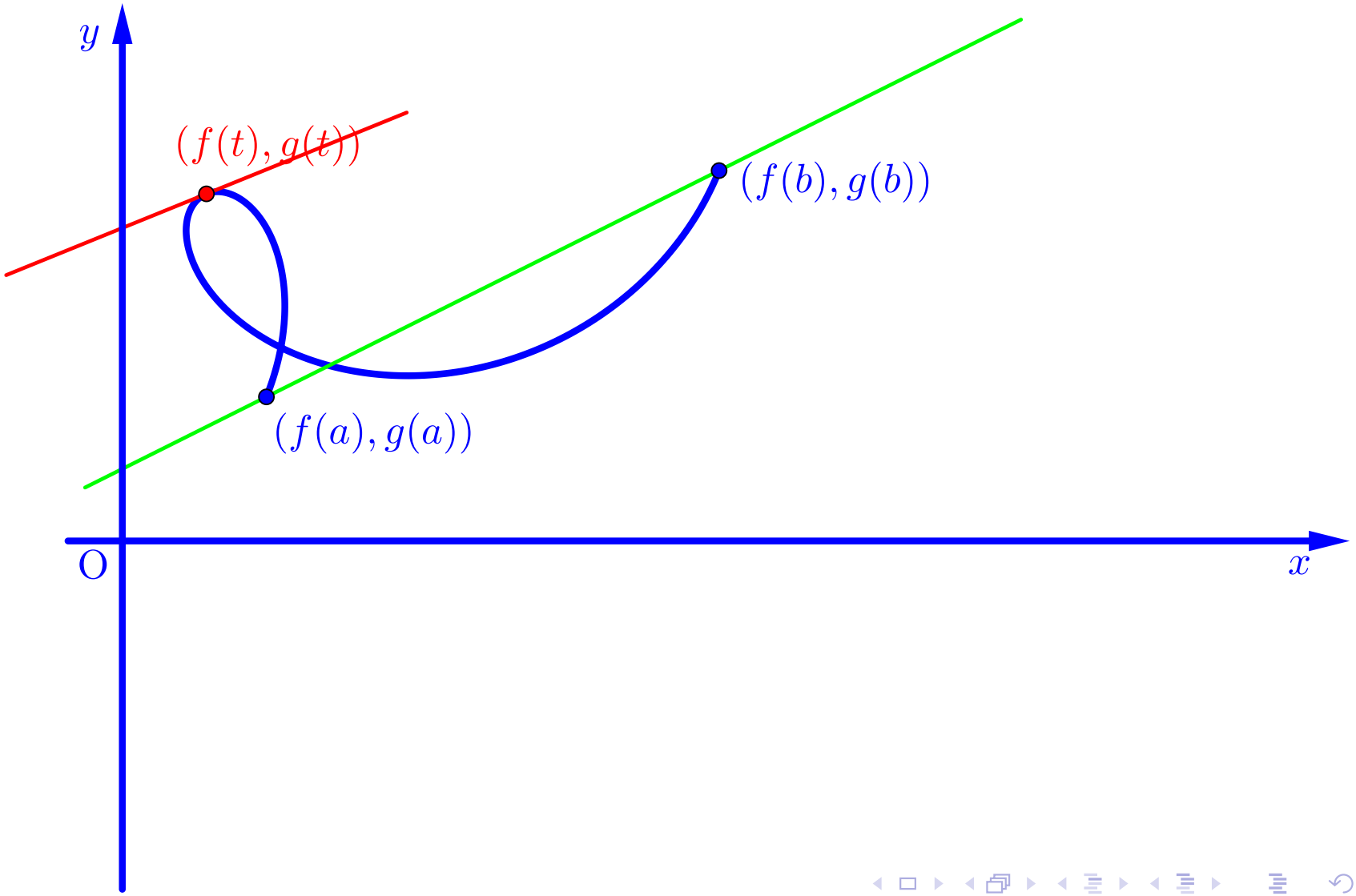

y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

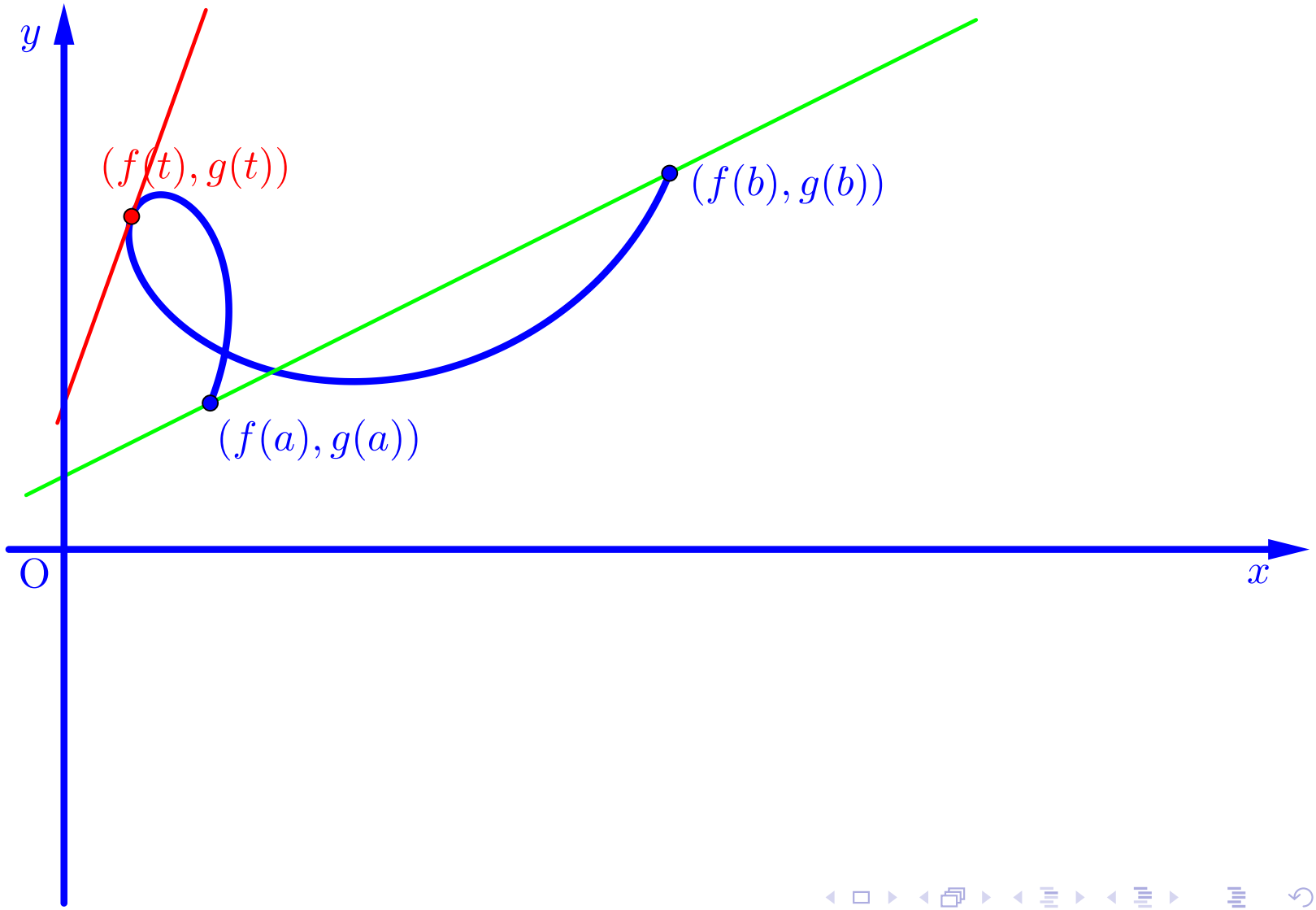

y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$


y
x
O
$(f(t), g(t))$
$(f(b), g(b))$
$(f(a), g(a))$


y
$(f(t), g(t))$
$(f(b), g(b))$
$(f(a), g(a))$
O
x


y
$(f(t), g(t))$
$(f(b), g(b))$
$(f(a), g(a))$
O
x


y
$(f(t), g(t))$
$(f(b), g(b))$
$(f(a), g(a))$
O
x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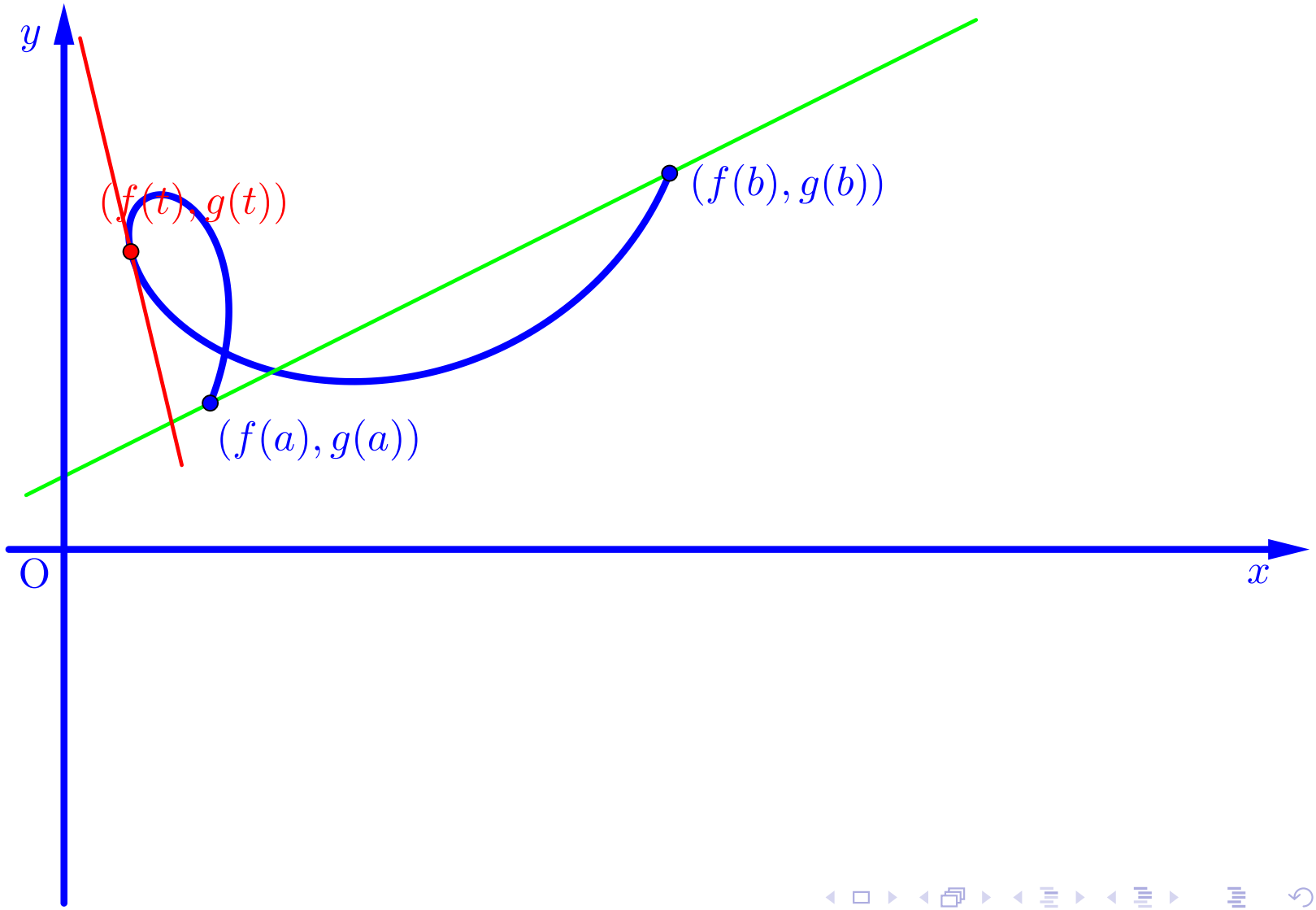
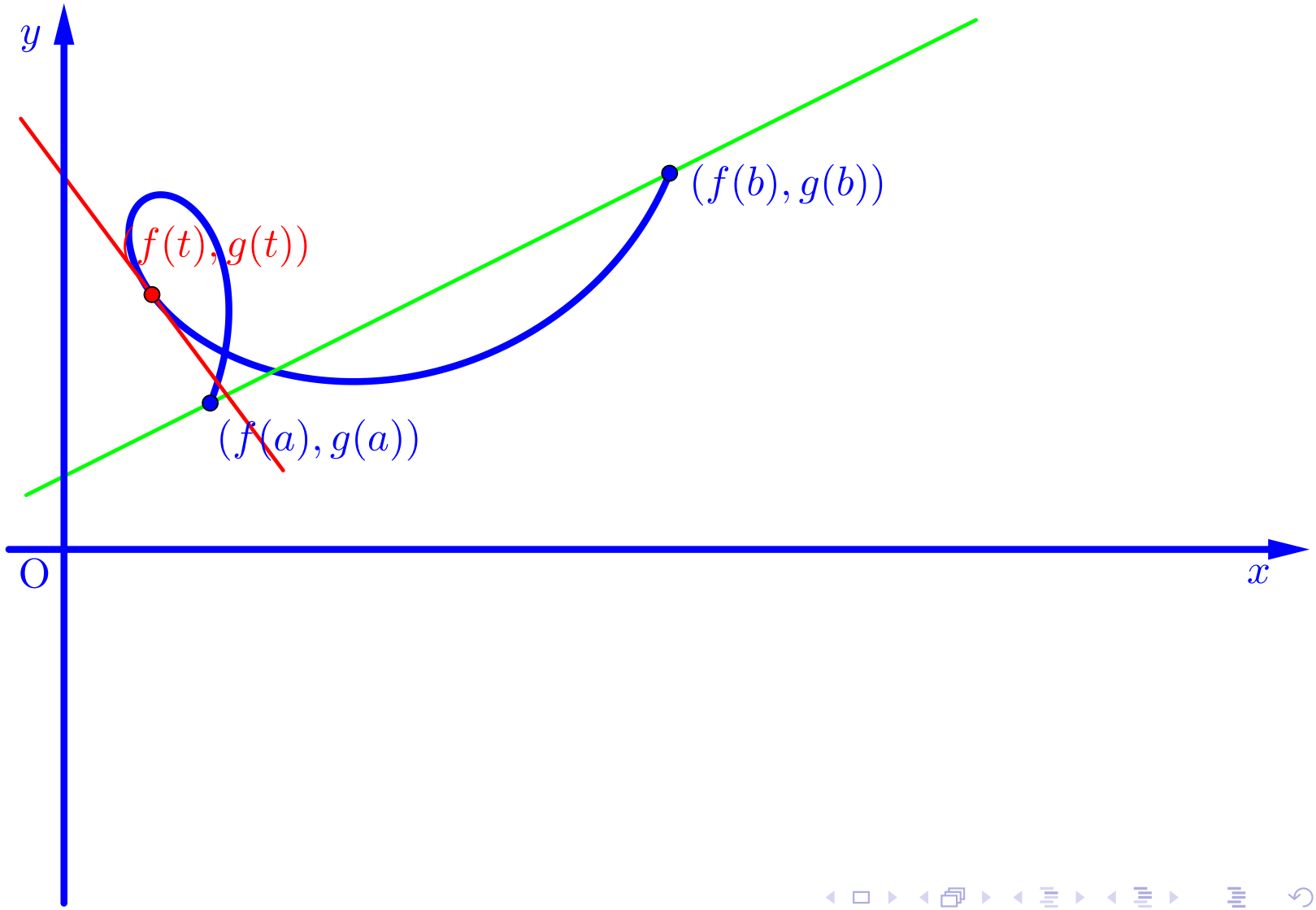
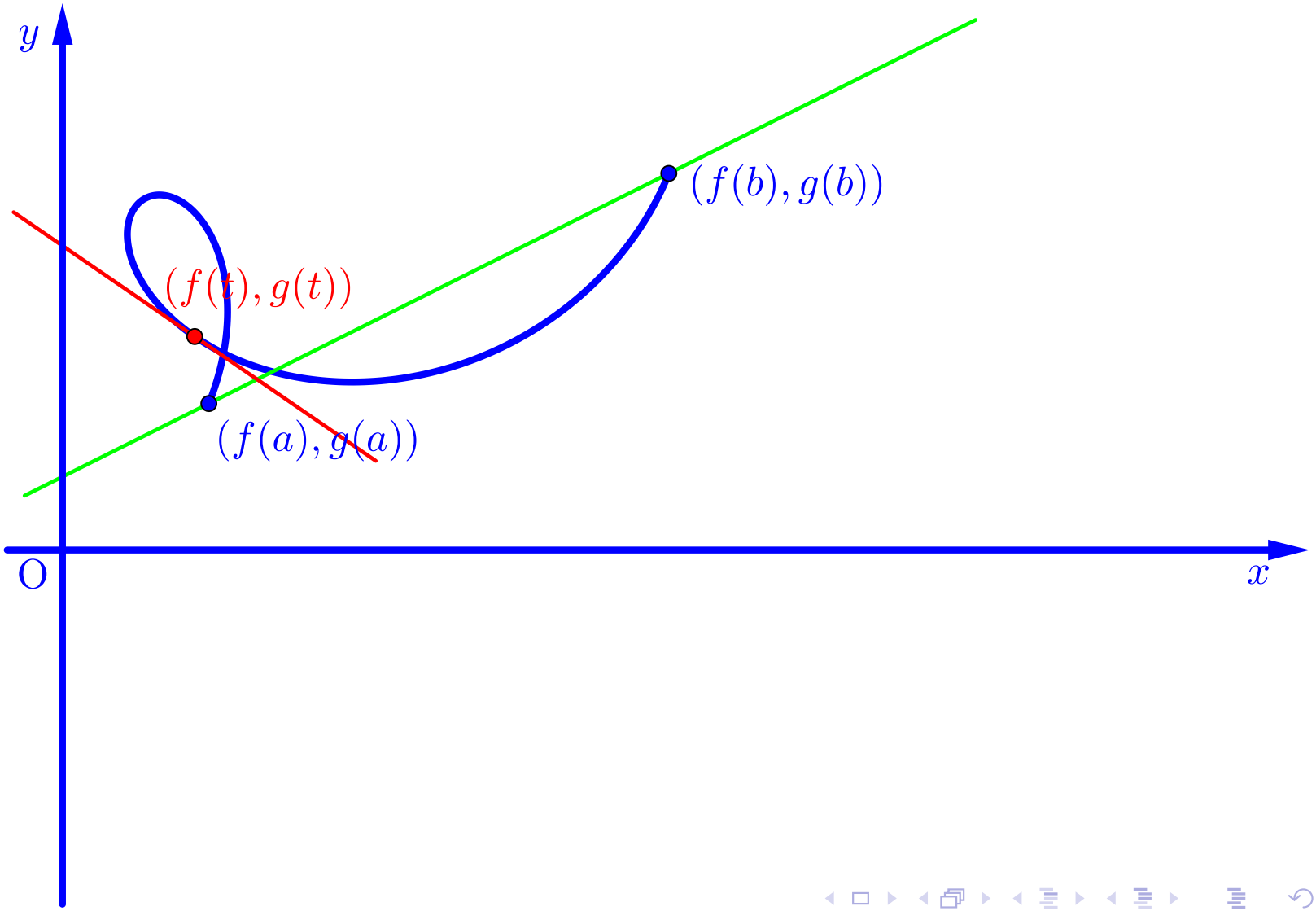
$(f(t), g(t))$
$(f(b), g(b))$
$(f(a), g(a))$
O
x


y
(f(t), g(t))
(f(b), g(b))
(f(a), g(a))
O
x


y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$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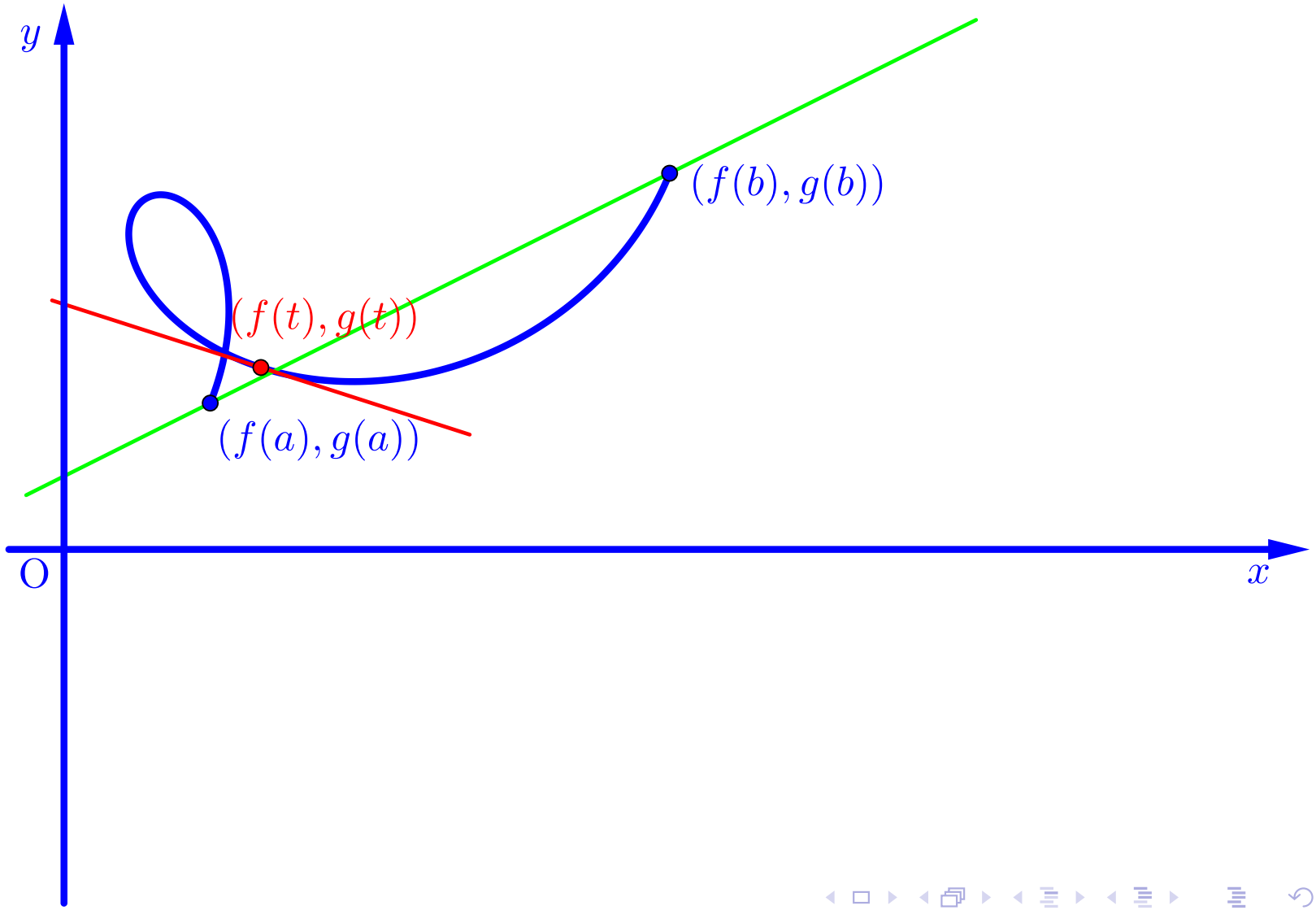
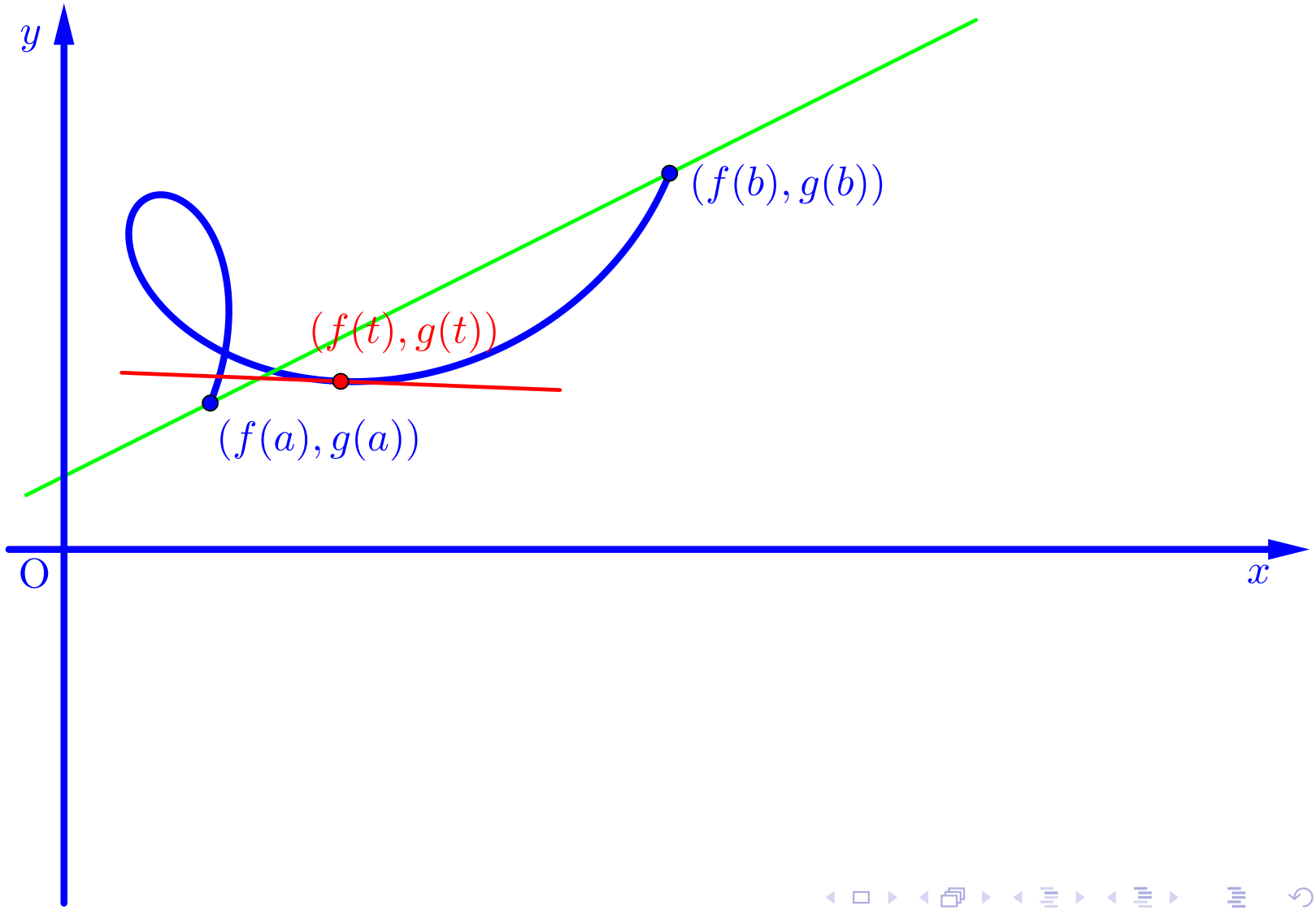
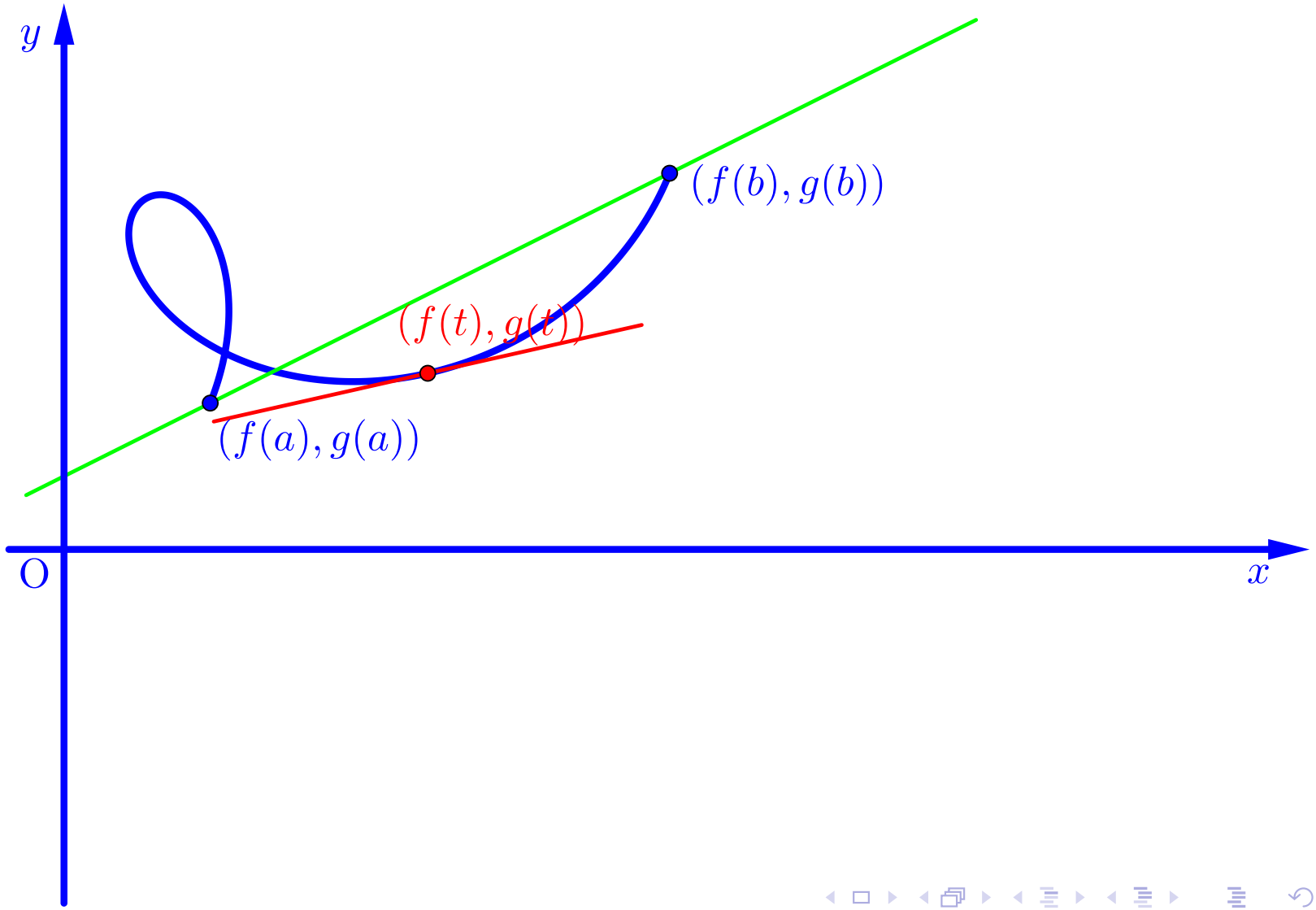
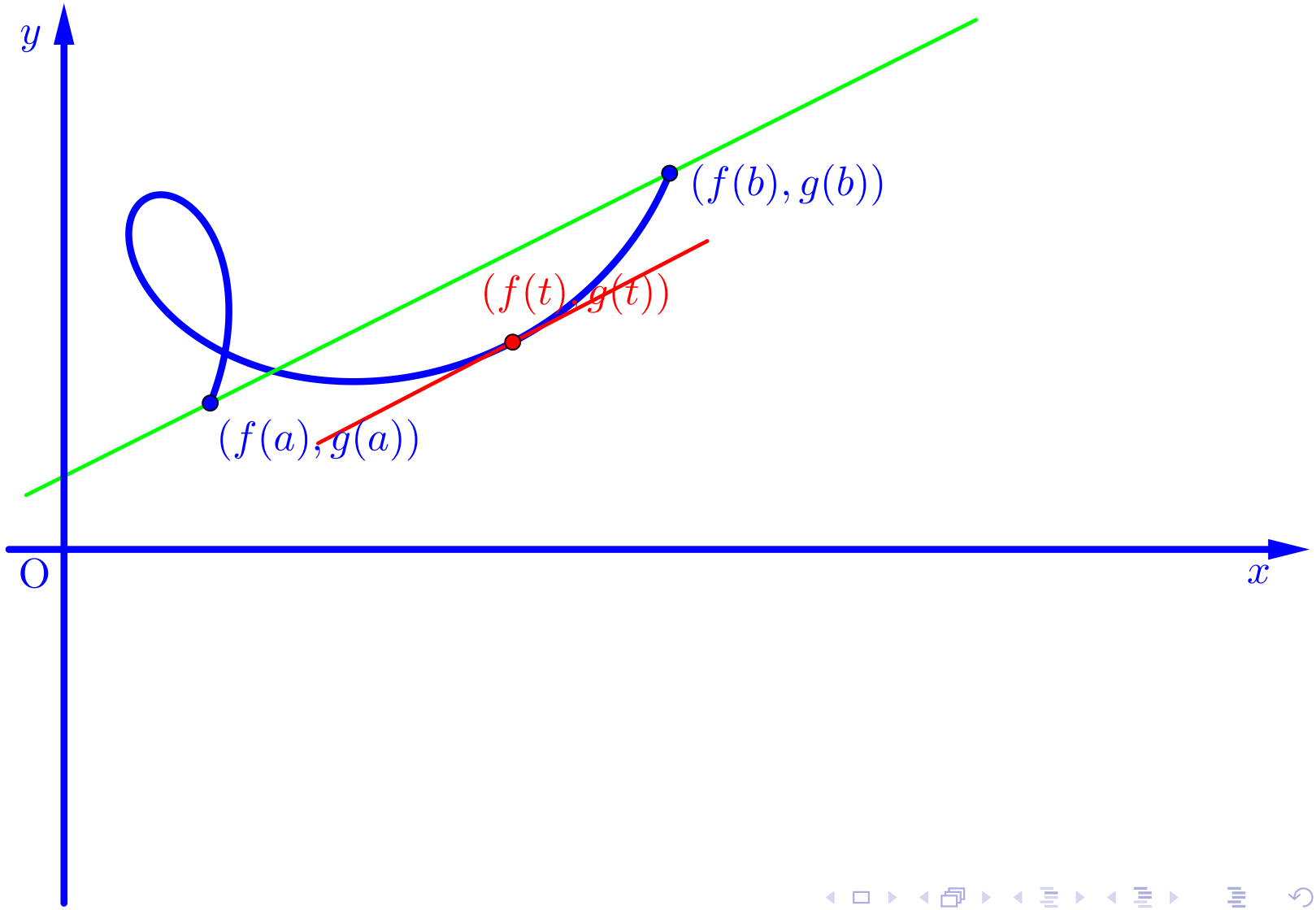
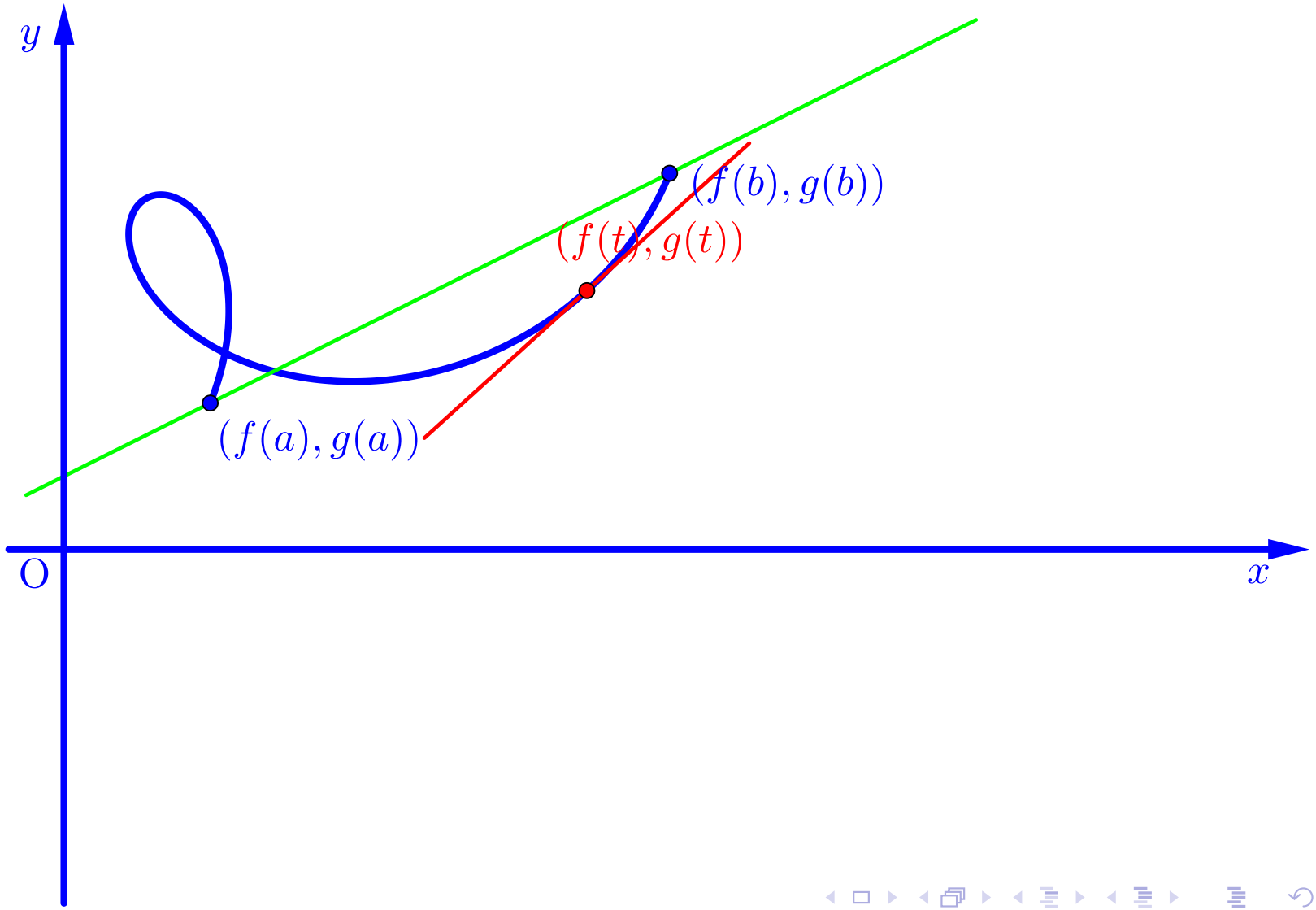
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

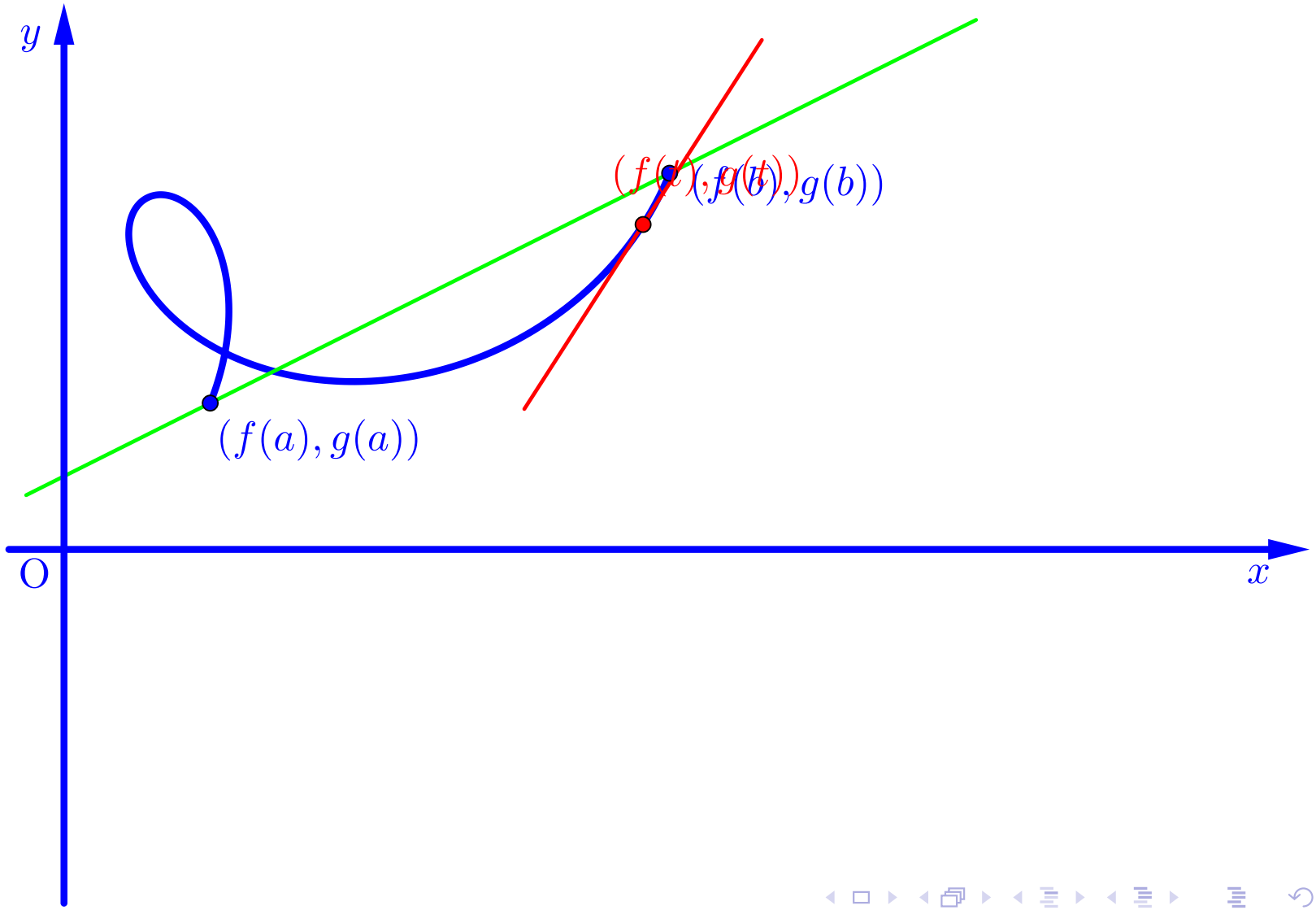

y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

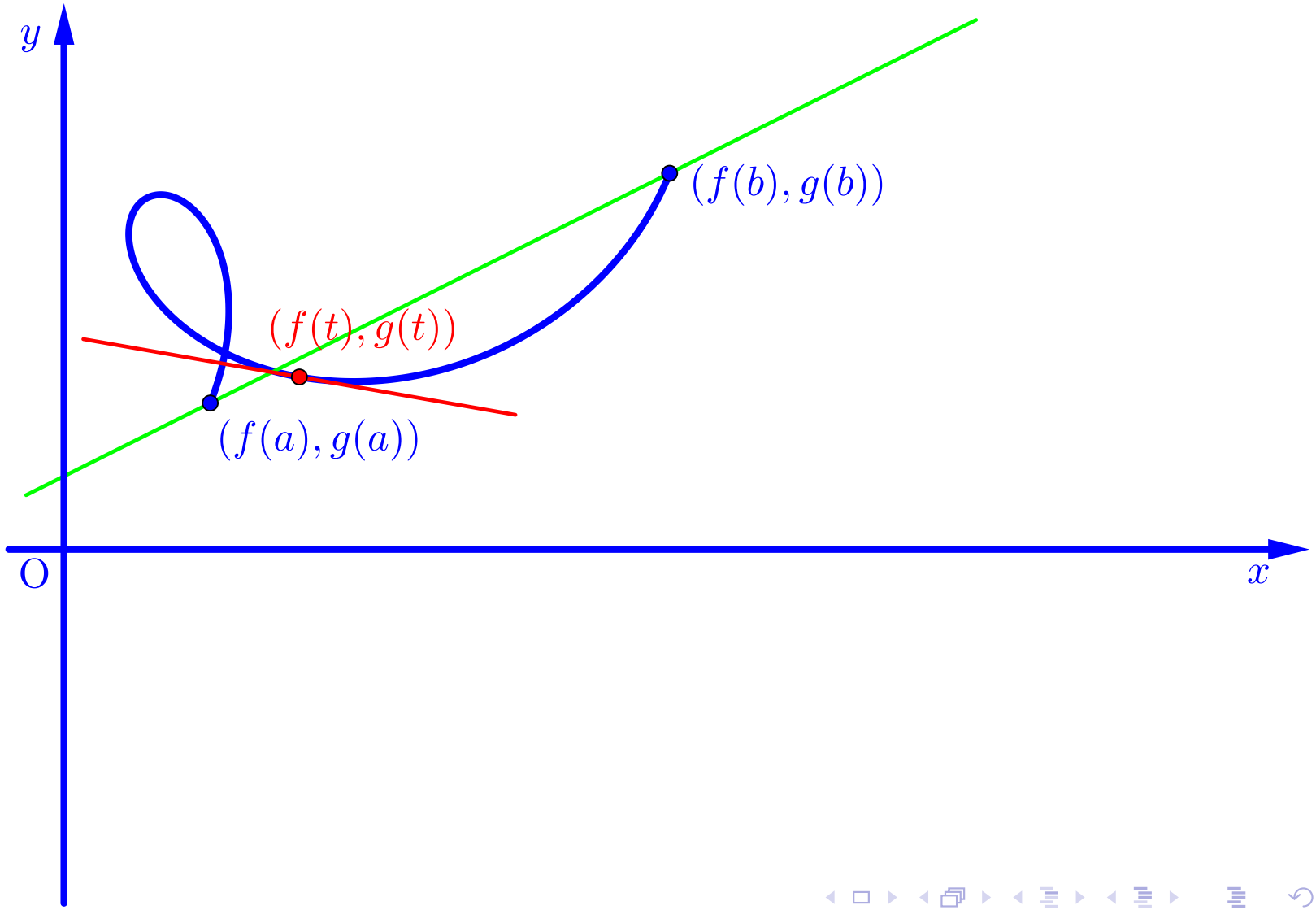

y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

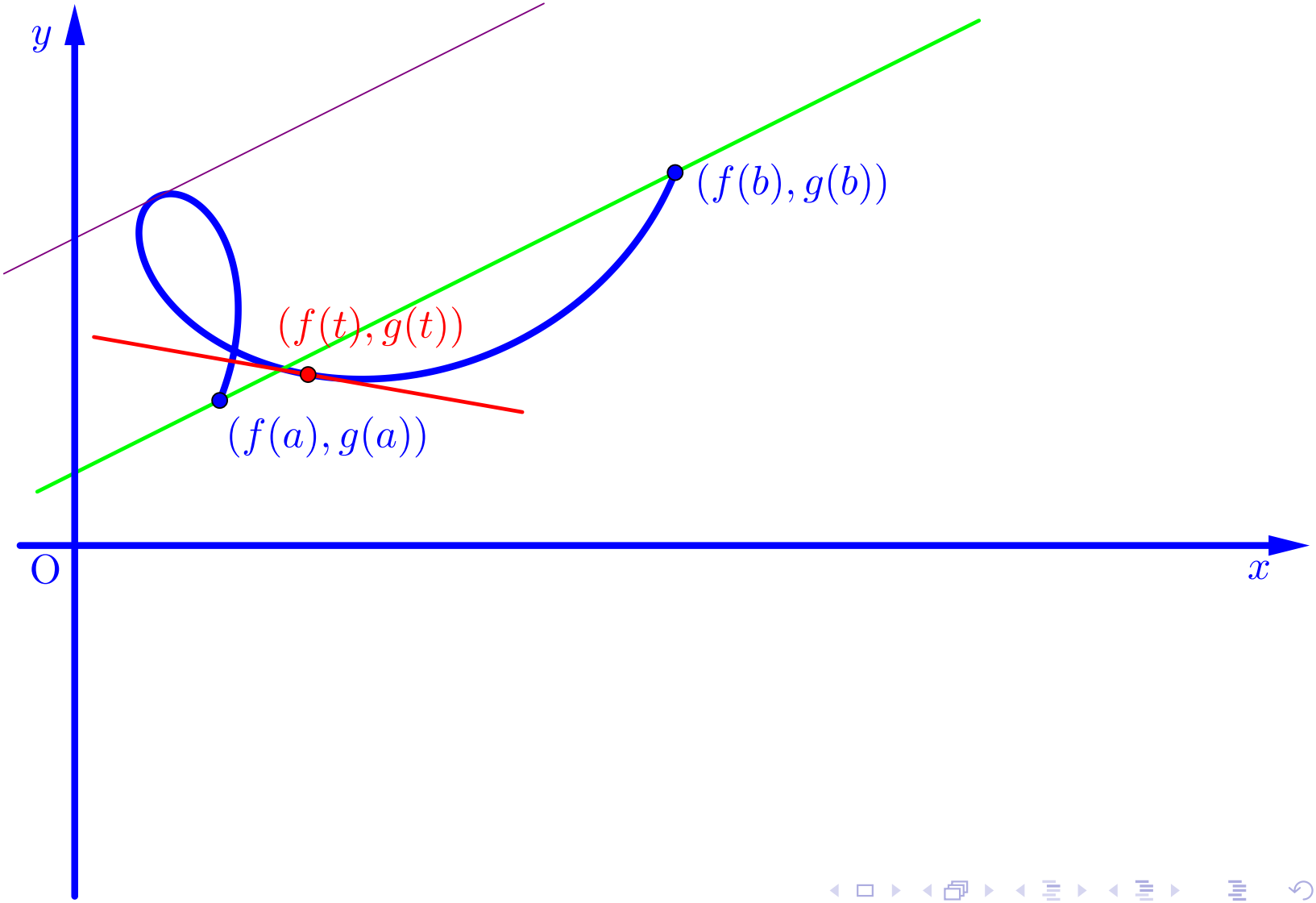

y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

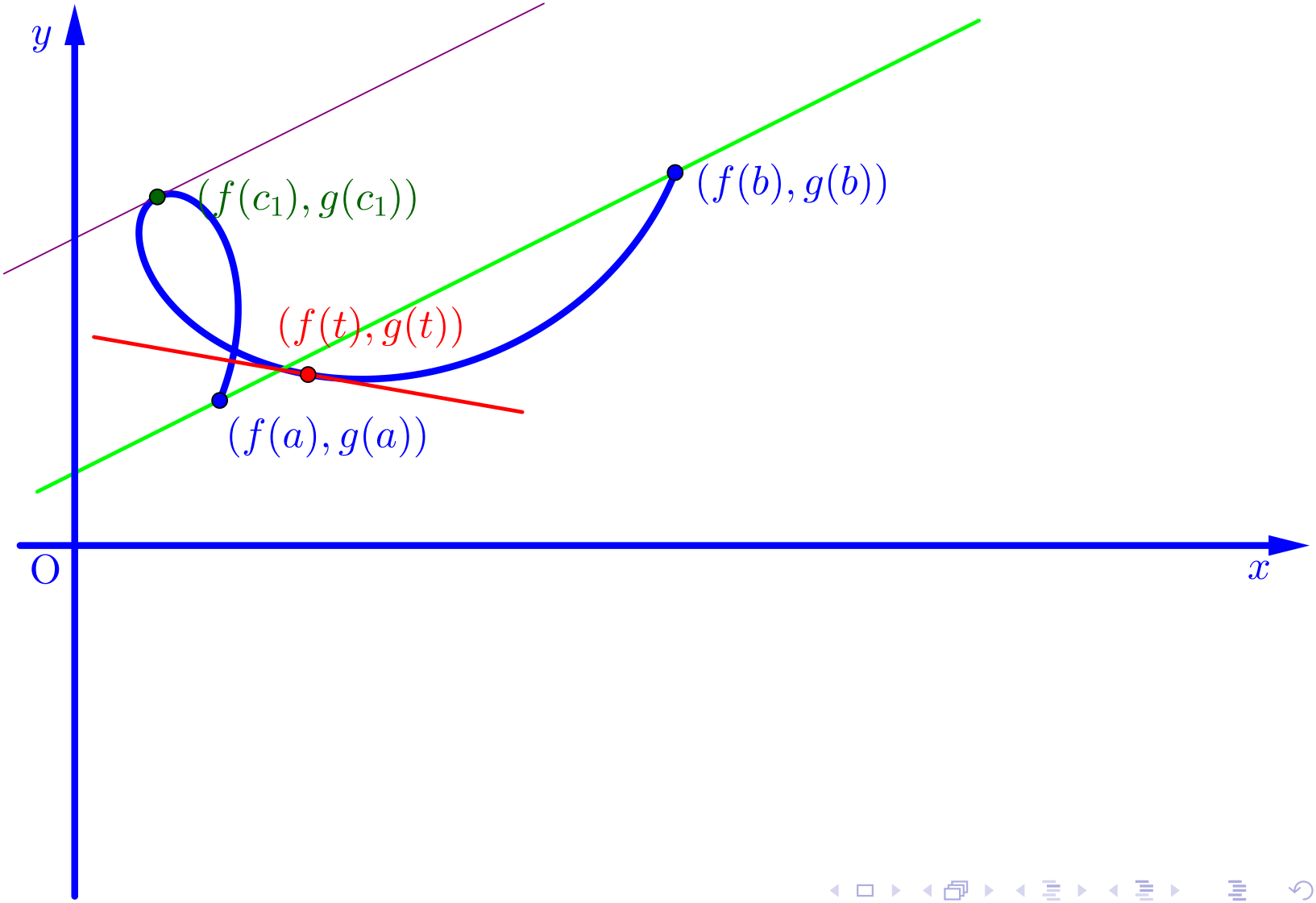

y
O
x
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

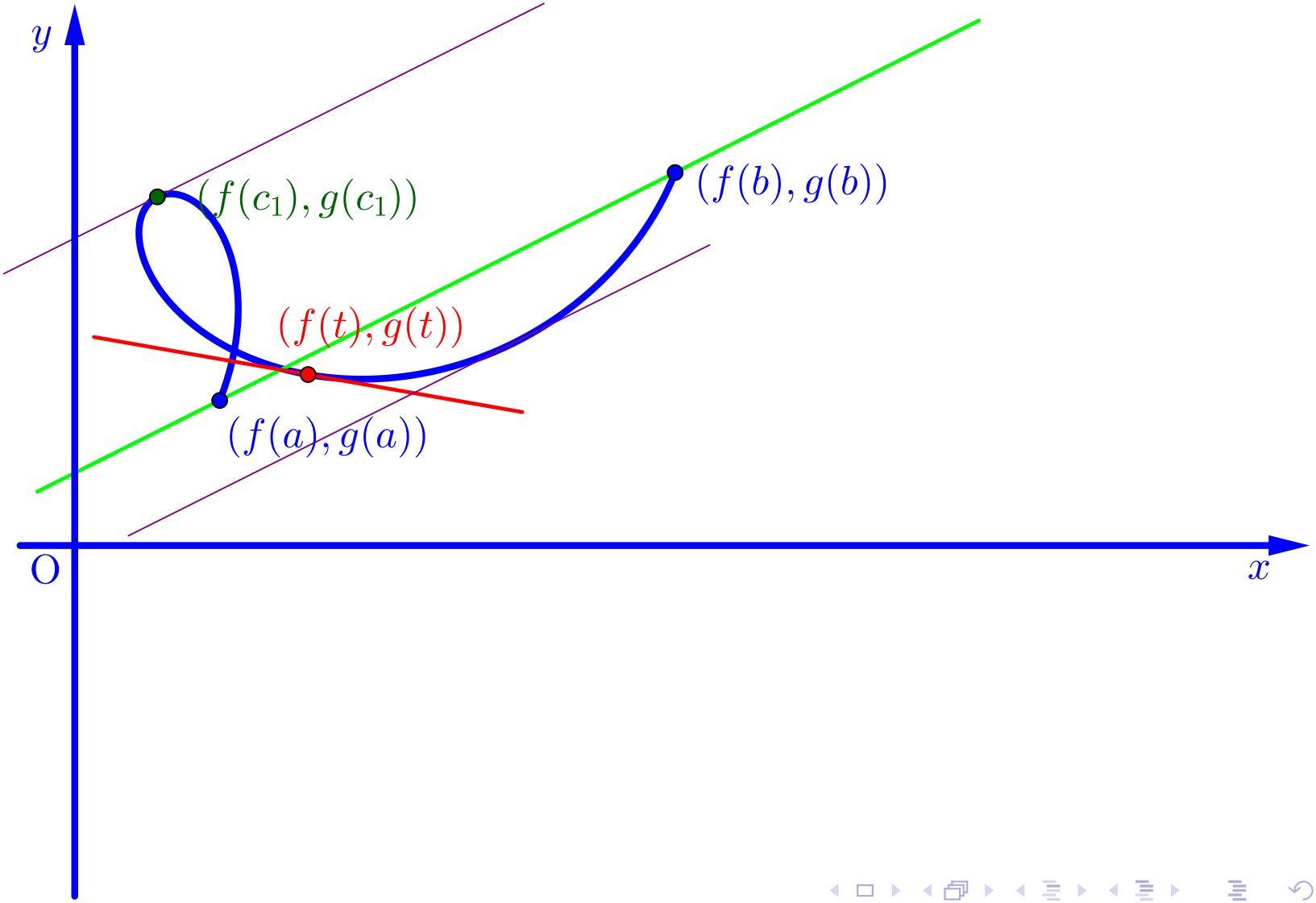

y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

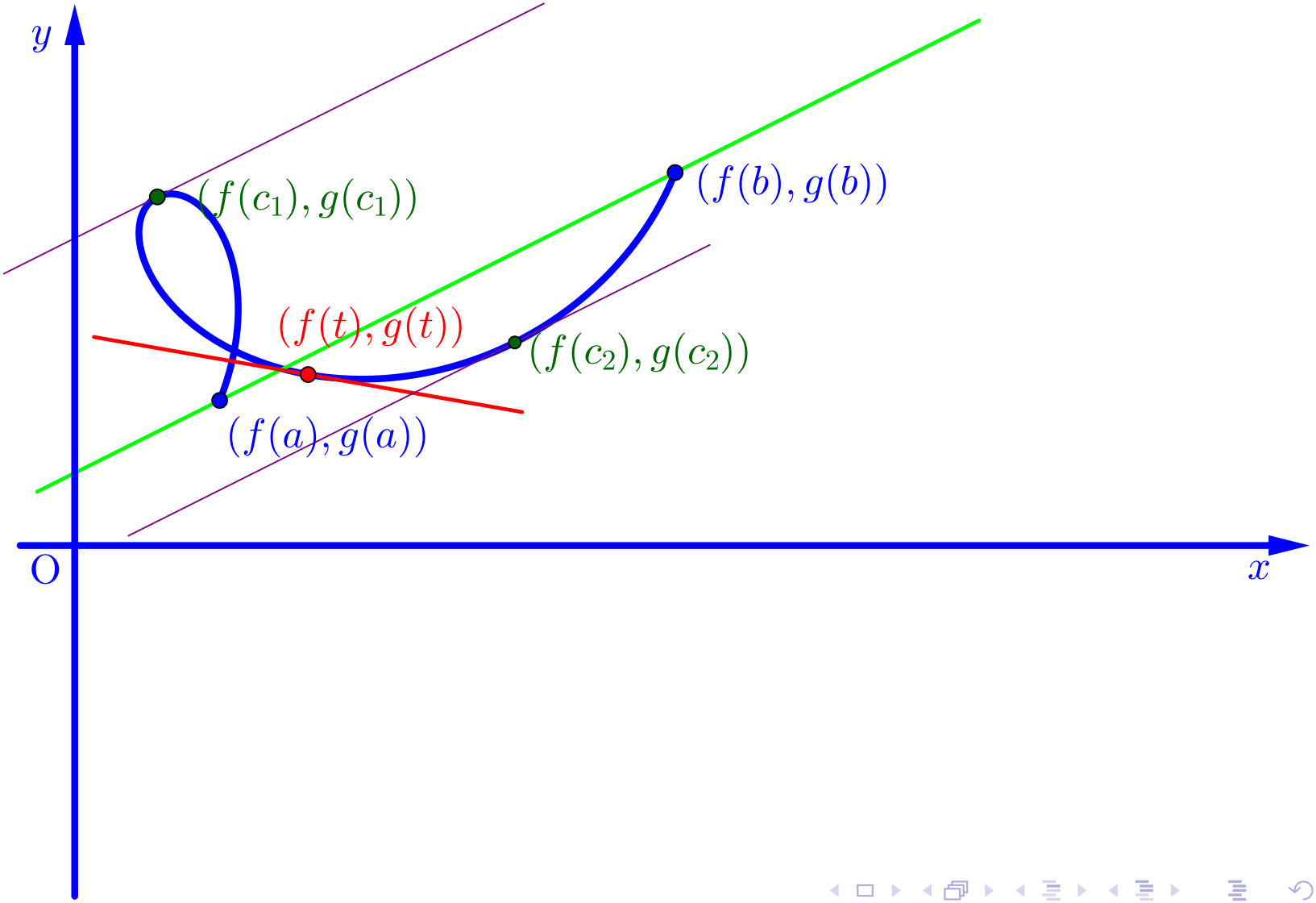

y
O
x
(f(a), g(a))
(f(b), g(b))


y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$


y
x
O
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$

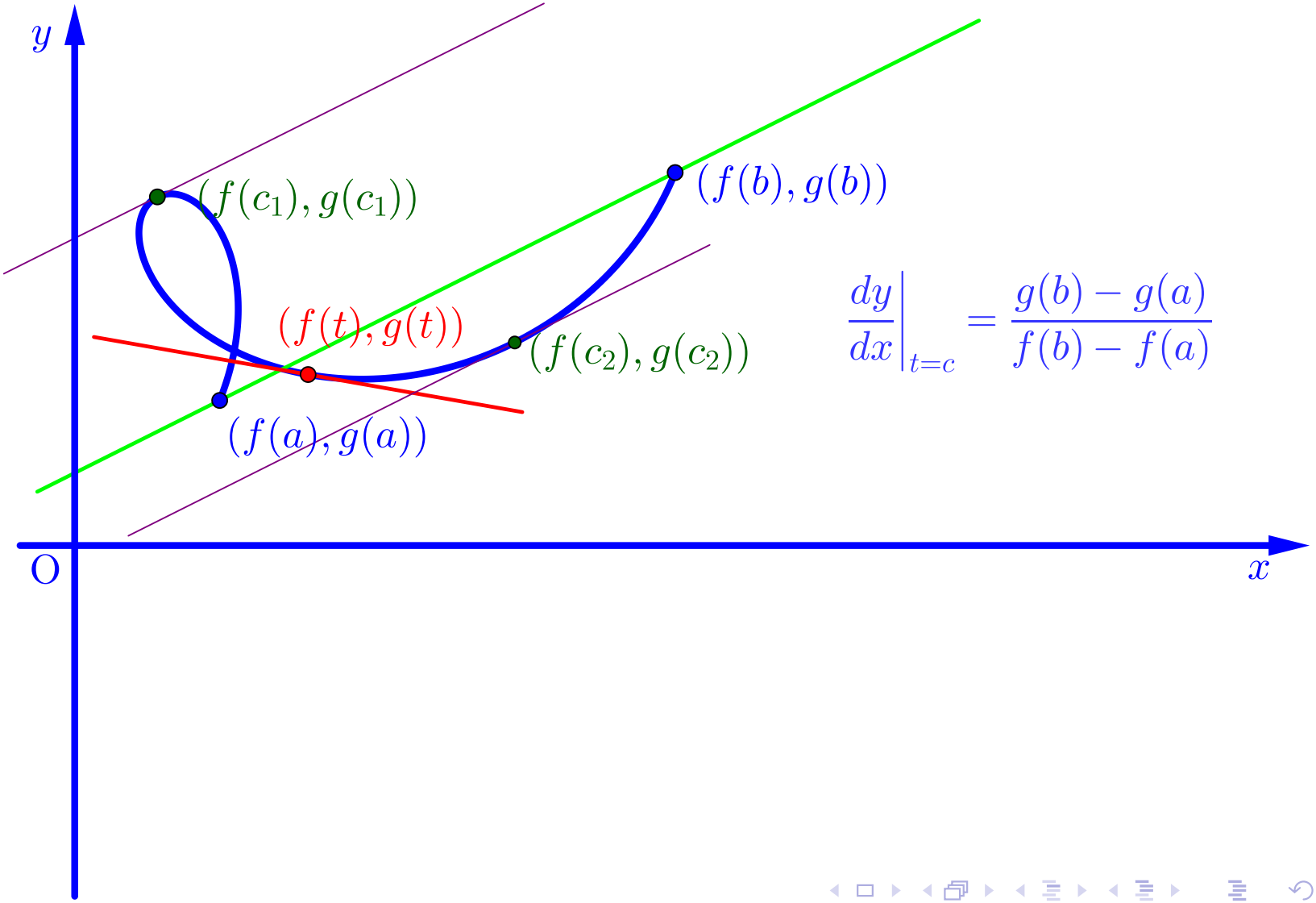

y
$(f(c_1), g(c_1))$
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$
O
x

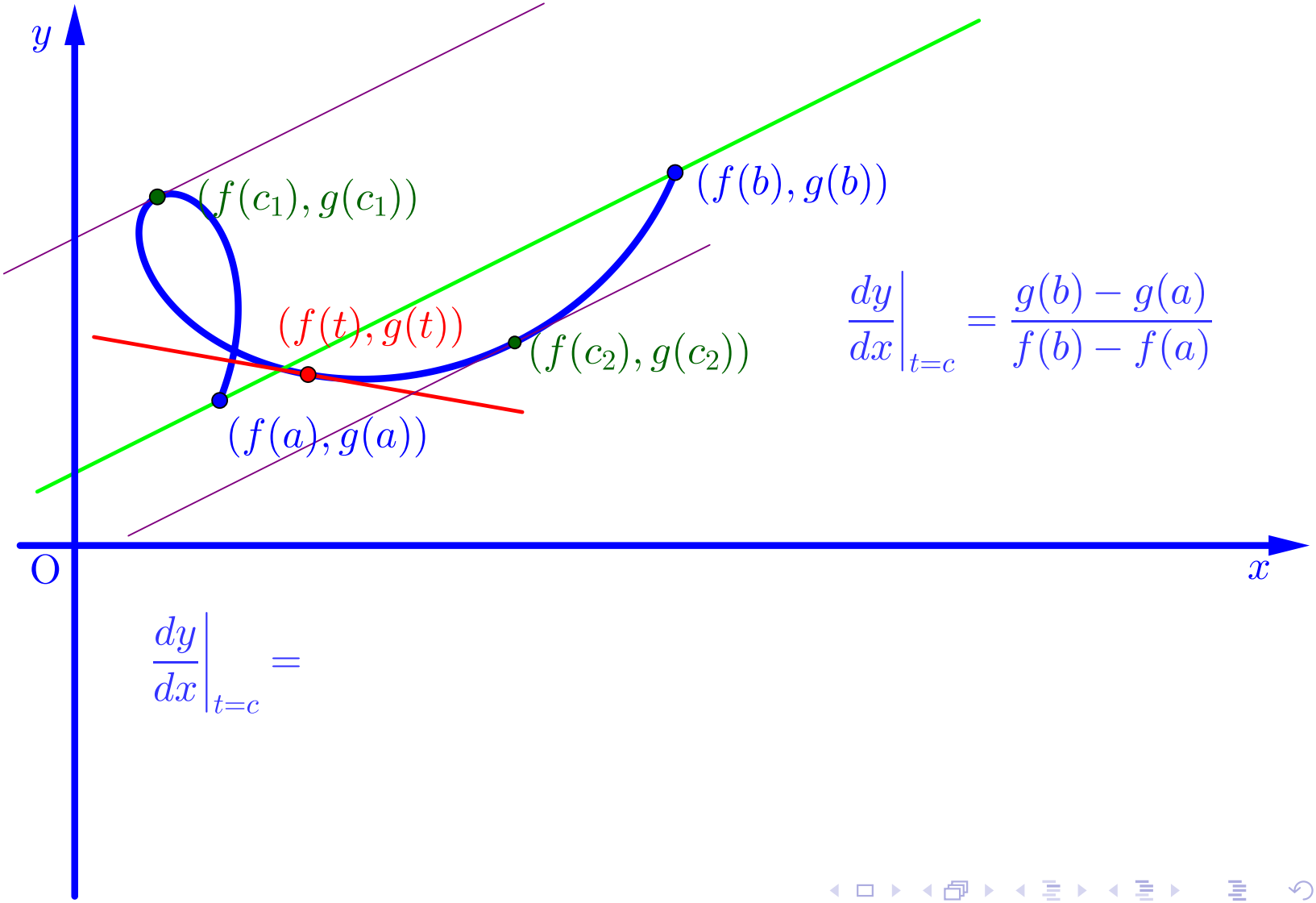

y
$(f(c_1), g(c_1))$
$(f(b), g(b))$
$(f(t), g(t))$
$(f(a), g(a))$
O
x

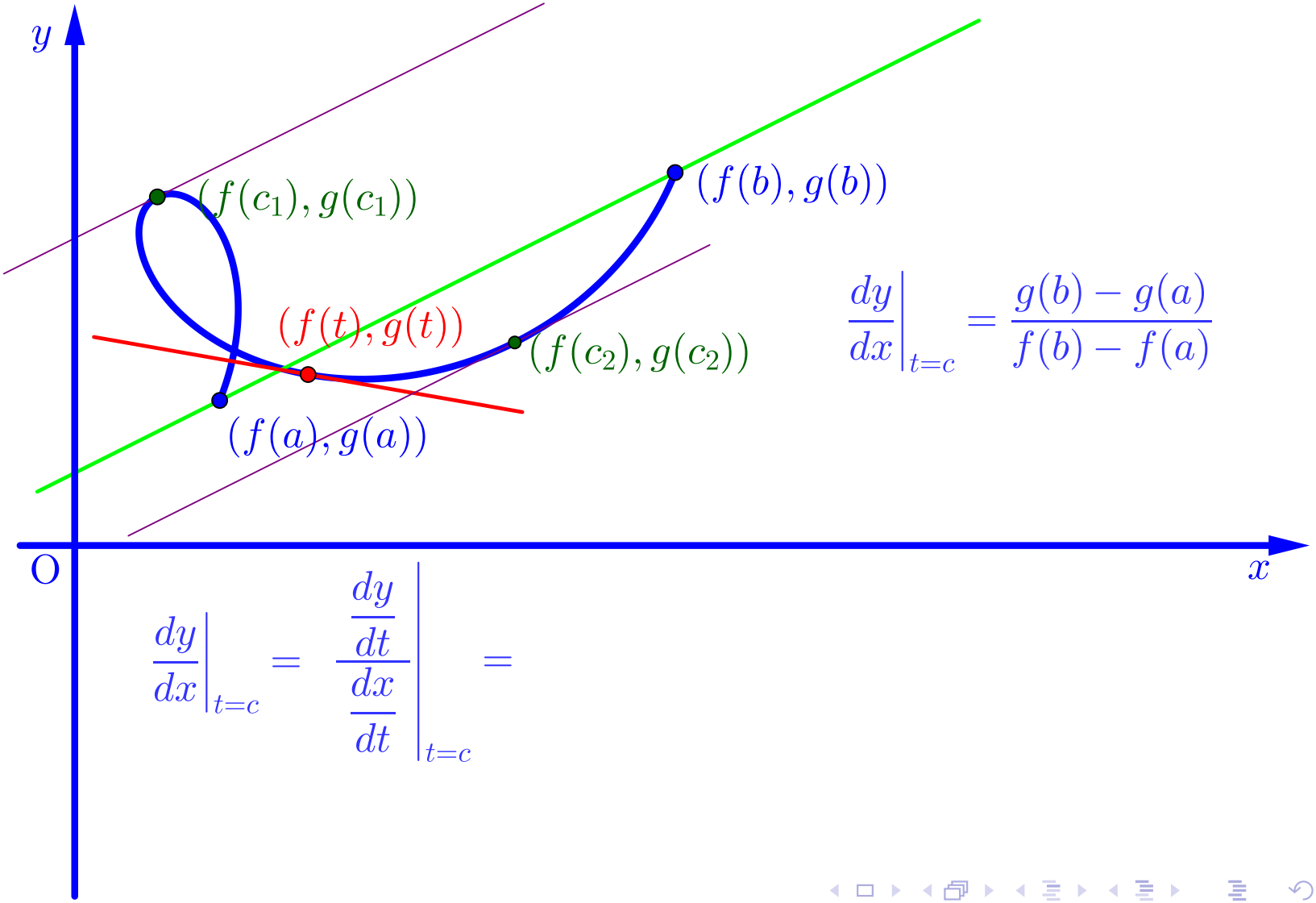

y
$(f(c_1), g(c_1))$
$(f(b), g(b))$
$(f(t), g(t))$
$(f(c_2), g(c_2))$
$(f(a), g(a))$
O
x

Cauchy's Mean Value Theorem

Start End

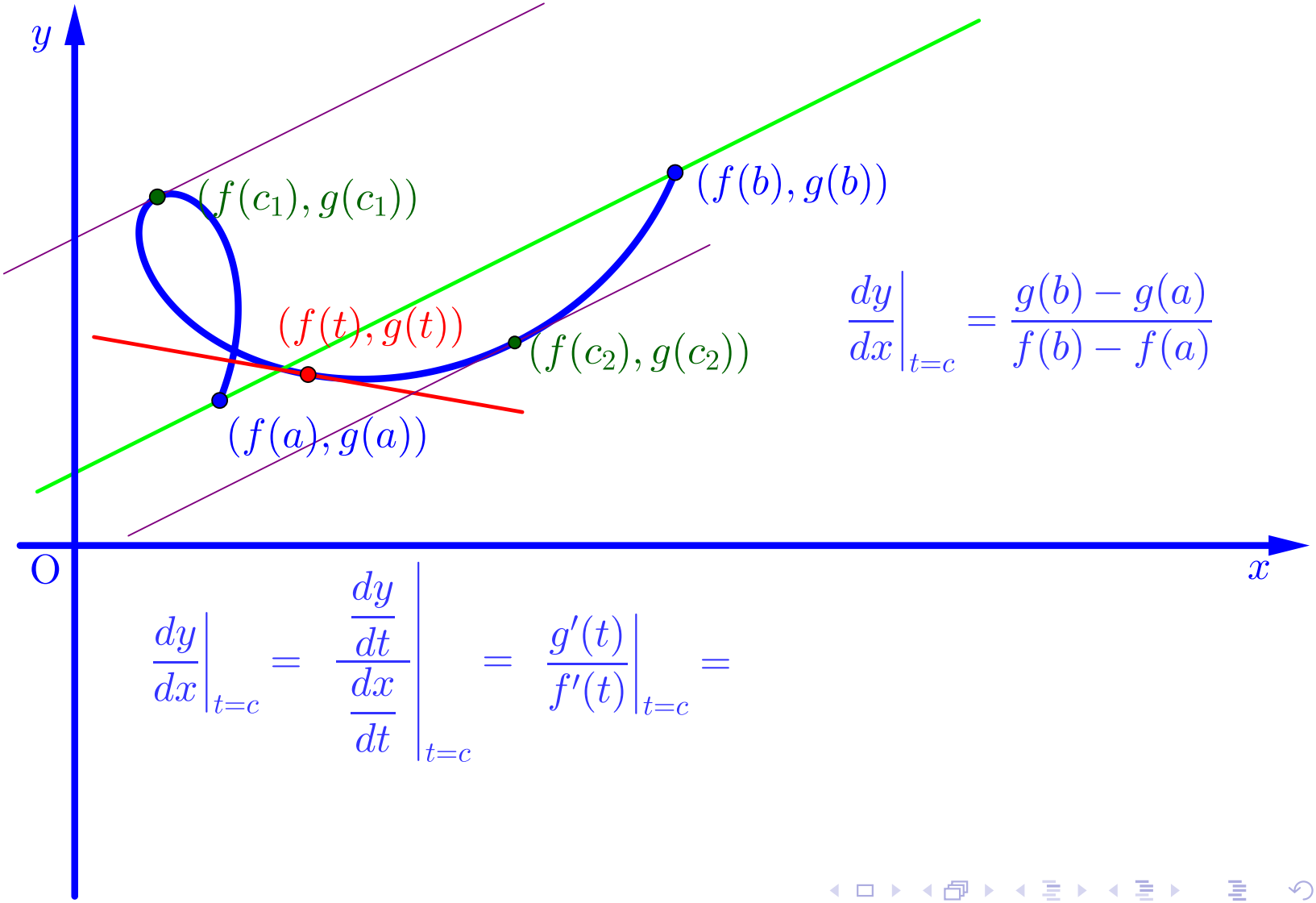


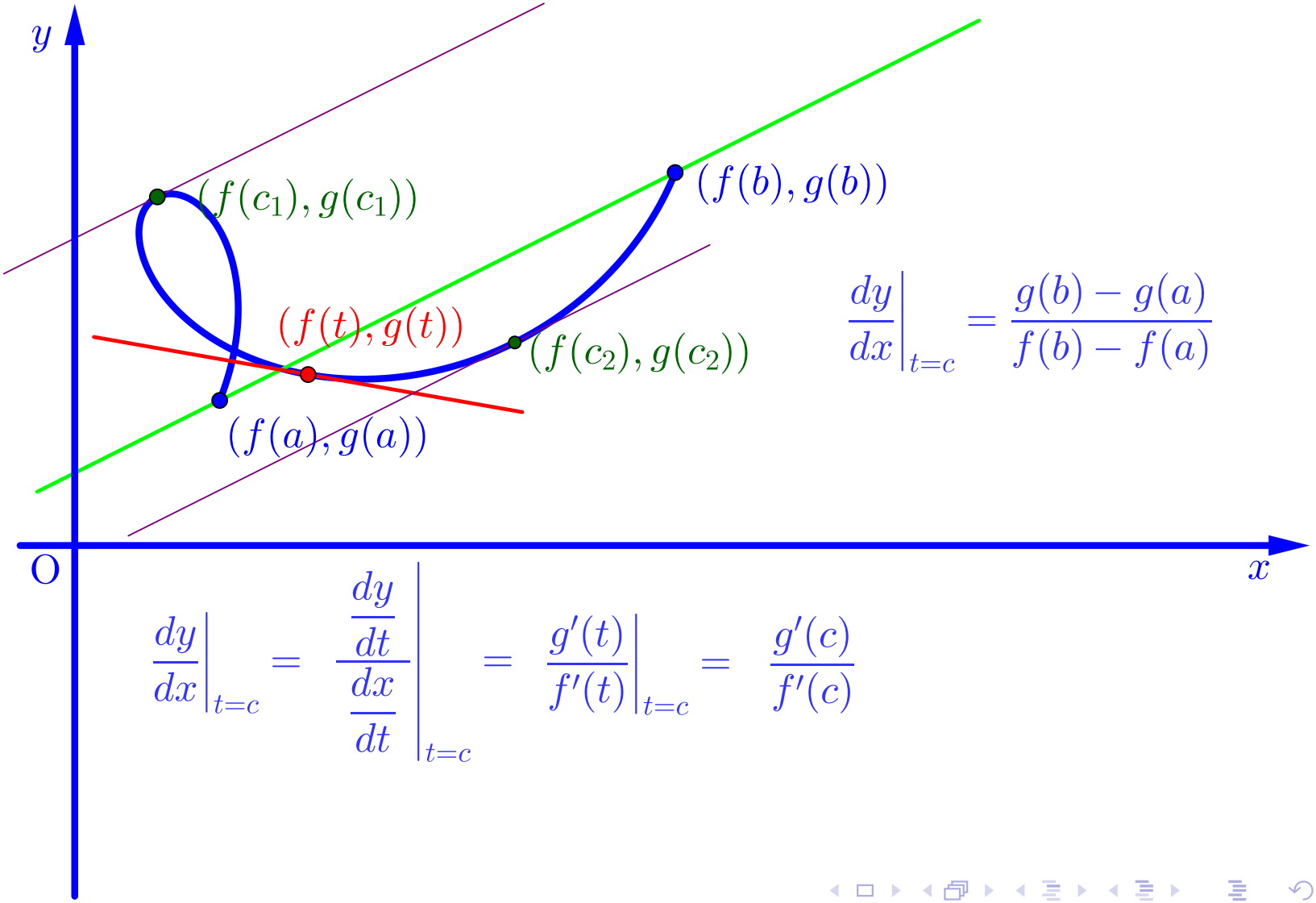

y
x
O
$(f(c_1), g(c_1))$
$(f(b), g(b))$
$(f(t), g(t))$
$(f(c_2), g(c_2))$
$(f(a), g(a))$
$\left.\frac{dy}{dx}\right|_{t=c} = \frac{g(b)-g(a)}{f(b)-f(a)}$
$\left.\frac{dy}{dx}\right|_{t=c} =$



$$\left.\frac{dy}{dx}\right|_{t=c} = \frac{g(b)-g(a)}{f(b)-f(a)}$$

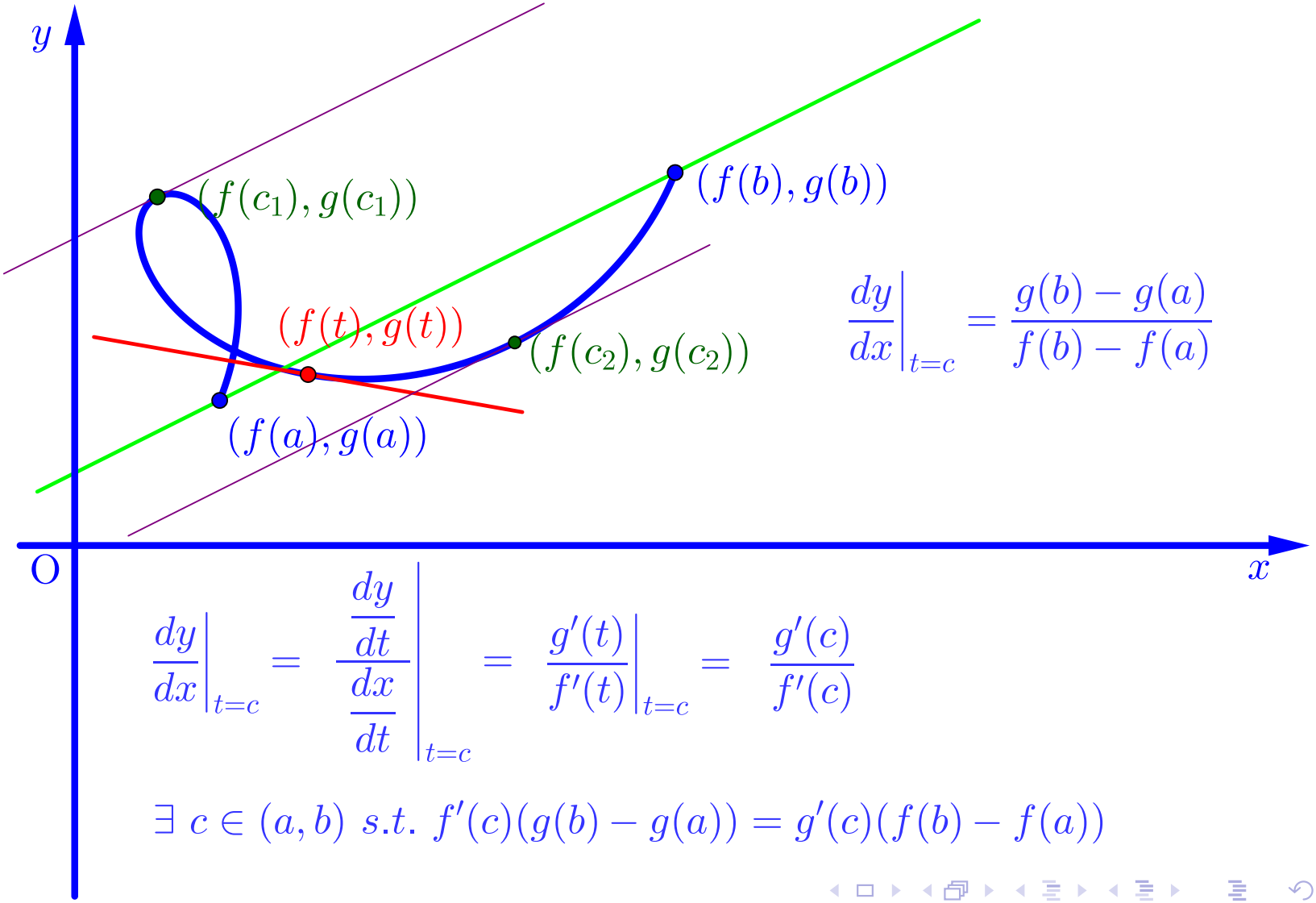
$$\left.\frac{dy}{dx}\right|_{t=c} = \left.\frac{\frac{dy}{dt}}{\frac{dx}{dt}}\right|_{t=c} =$$


y
x
O
$(f(c_1), g(c_1))$
$(f(b), g(b))$
$(f(t), g(t))$
$(f(c_2), g(c_2))$
$(f(a), g(a))$
$\left.\frac{dy}{dx}\right|_{t=c} = \frac{g(b)-g(a)}{f(b)-f(a)}$
$\left.\frac{dy}{dx}\right|_{t=c} = \left.\frac{\frac{dy}{dt}}{\frac{dx}{dt}}\right|_{t=c} = \left.\frac{g'(t)}{f'(t)}\right|_{t=c} =$



$$\left.\frac{dy}{dx}\right|_{t=c} = \frac{g(b)-g(a)}{f(b)-f(a)}$$

$$\left.\frac{dy}{dx}\right|_{t=c} = \left.\frac{\frac{dy}{dt}}{\frac{dx}{dt}}\right|_{t=c} = \left.\frac{g'(t)}{f'(t)}\right|_{t=c} = \frac{g'(c)}{f'(c)}$$



$$\left.\frac{dy}{dx}\right|_{t=c} = \frac{g(b)-g(a)}{f(b)-f(a)}$$

$$\left.\frac{dy}{dx}\right|_{t=c} = \left.\frac{\frac{dy}{dt}}{\frac{dx}{dt}}\right|_{t=c} = \left.\frac{g'(t)}{f'(t)}\right|_{t=c} = \frac{g'(c)}{f'(c)}$$

$$\exists\ c \in (a,b)\ s.t.\ f'(c)(g(b)-g(a)) = g'(c)(f(b)-f(a))$$

Github:
https://min7014.github.io/math20240225001.html

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and you can see a picture moving.