

Tangent lines

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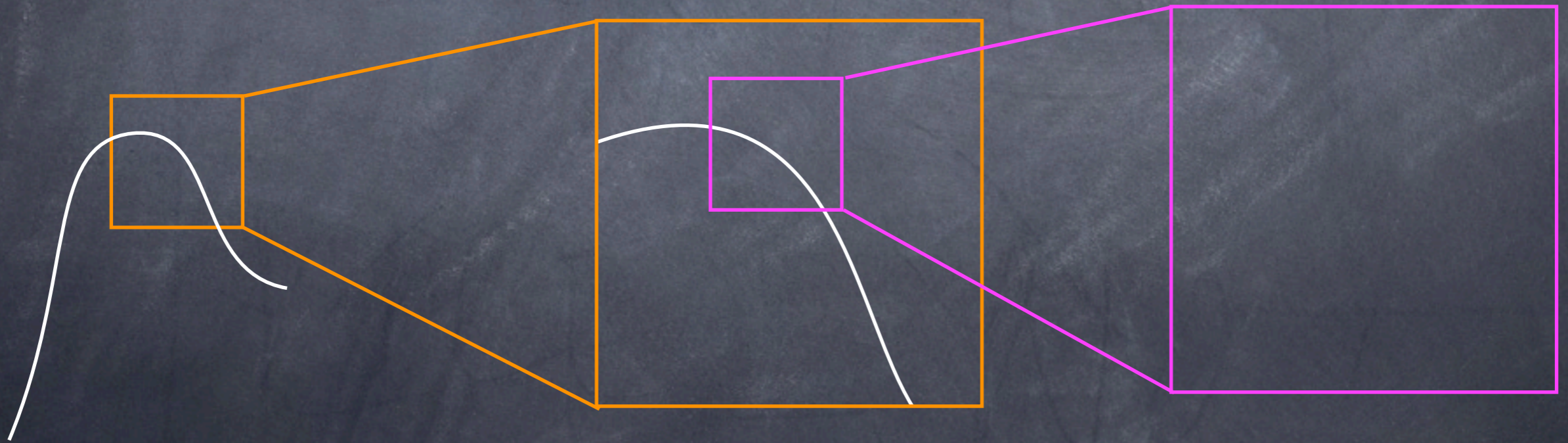
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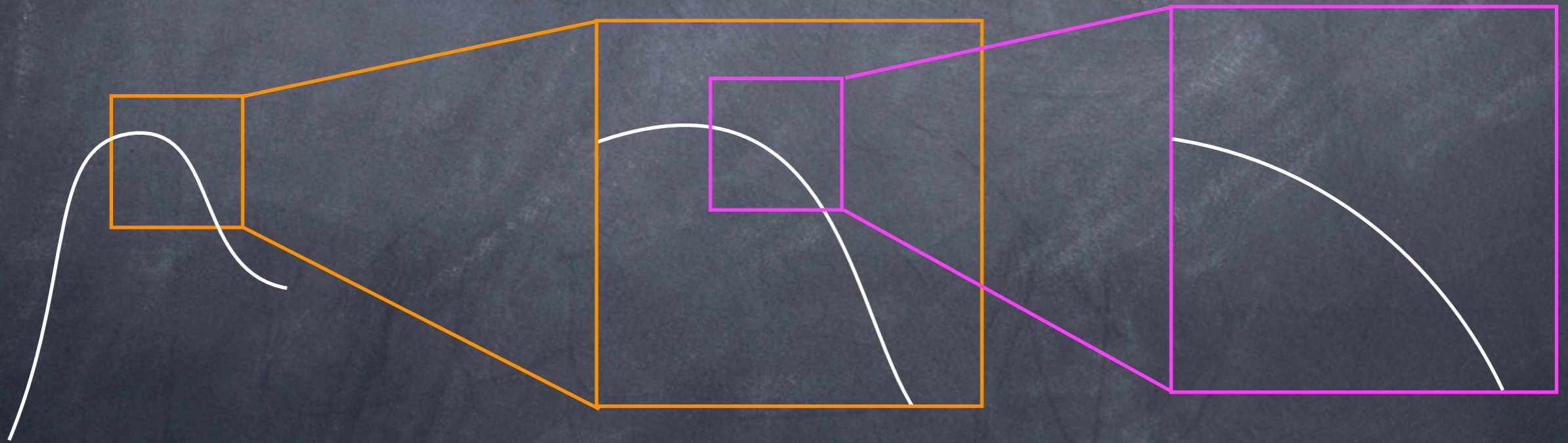
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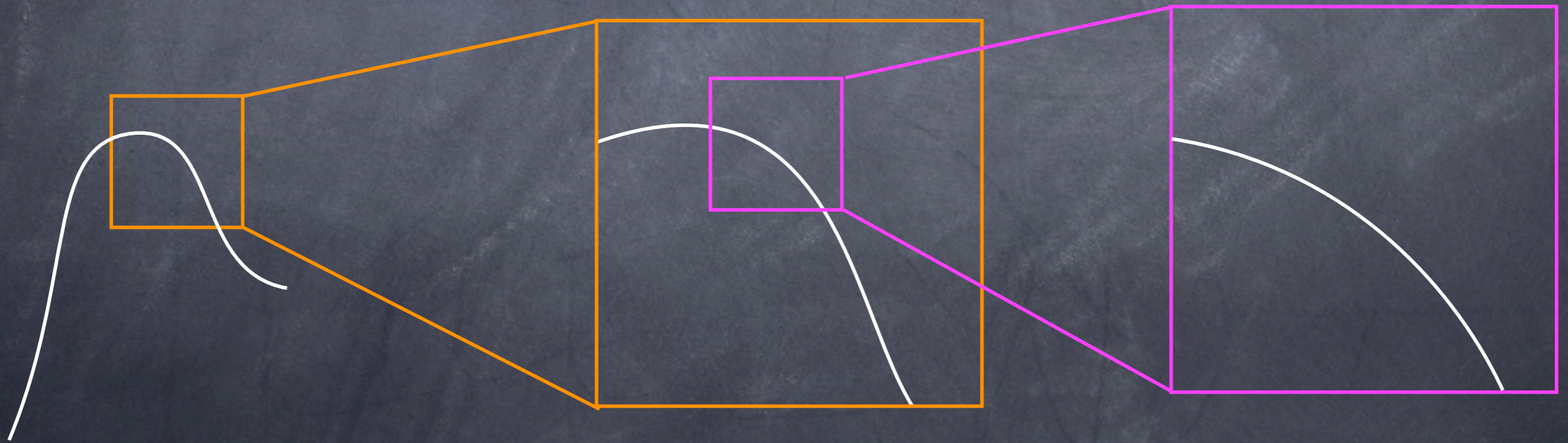
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Keep going, you'll see a straight line.

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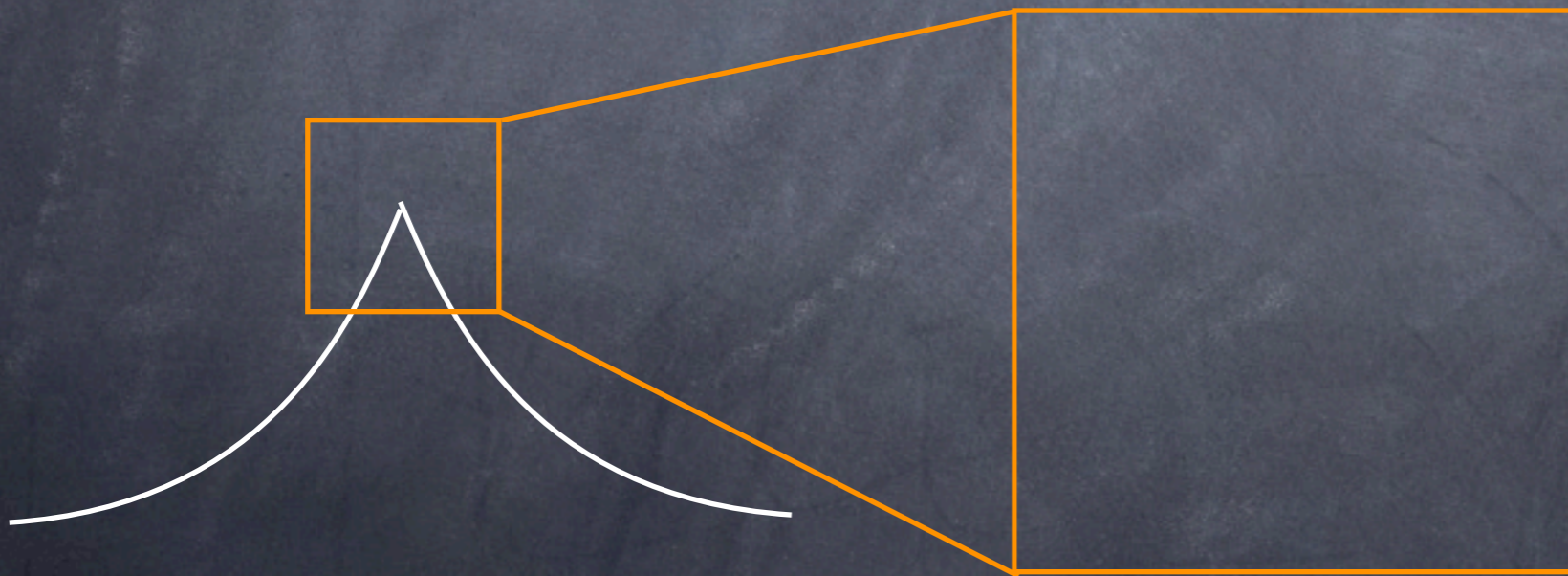
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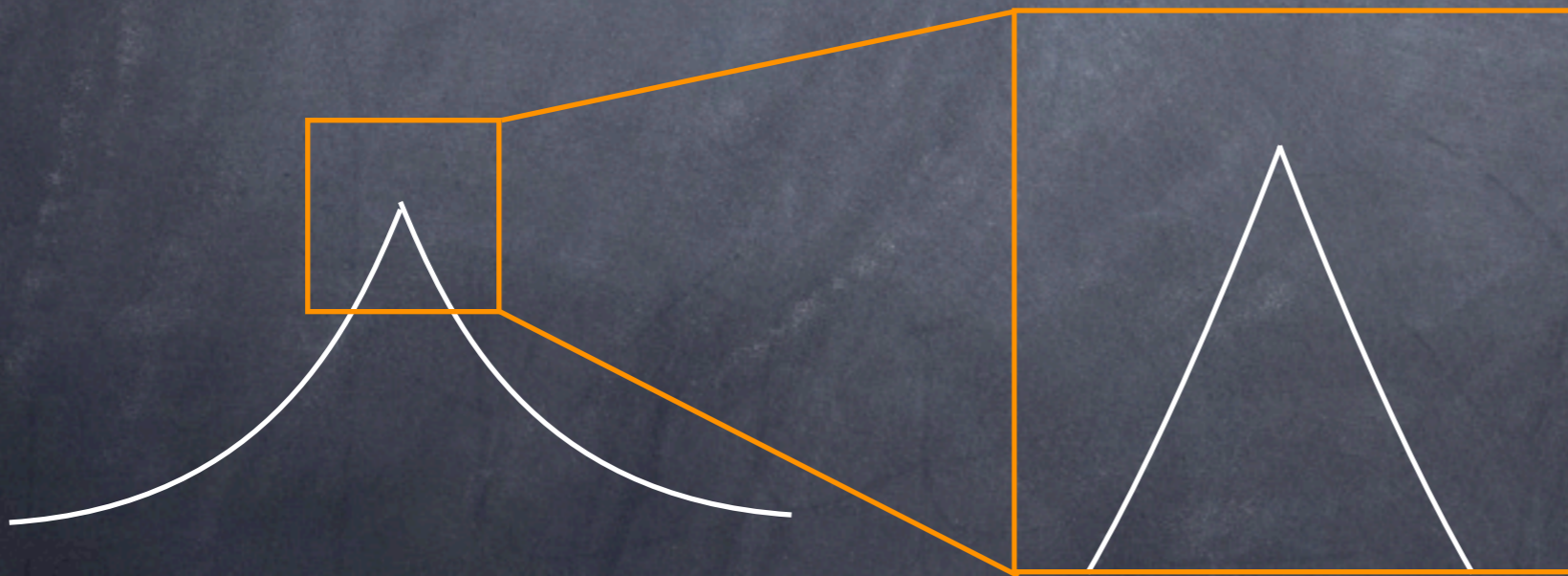
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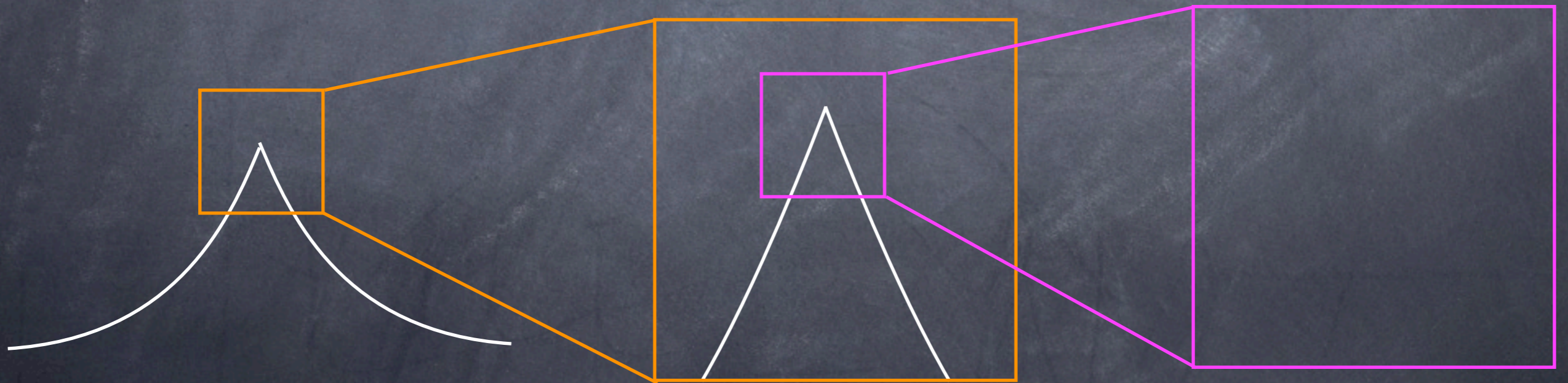
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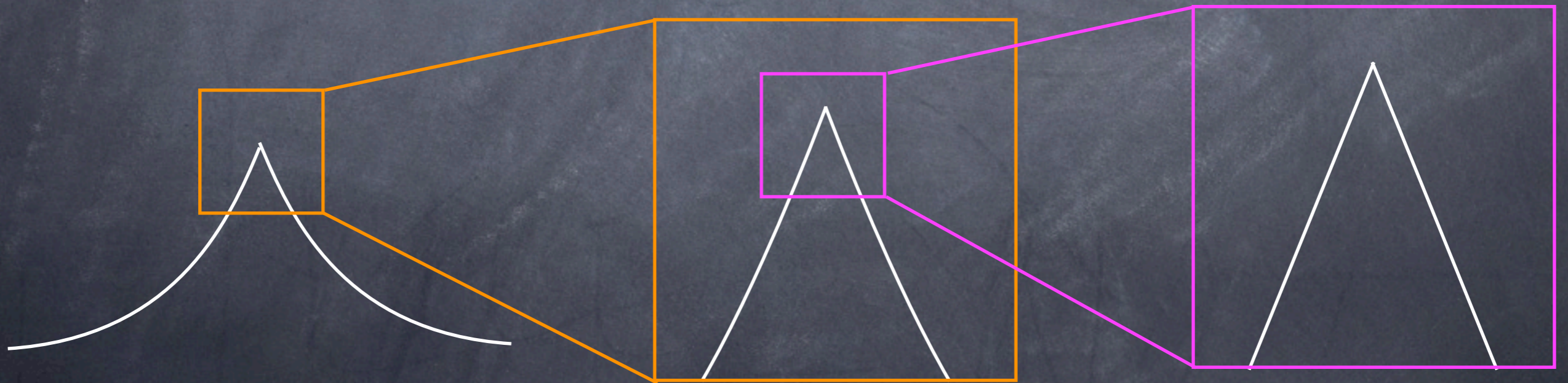
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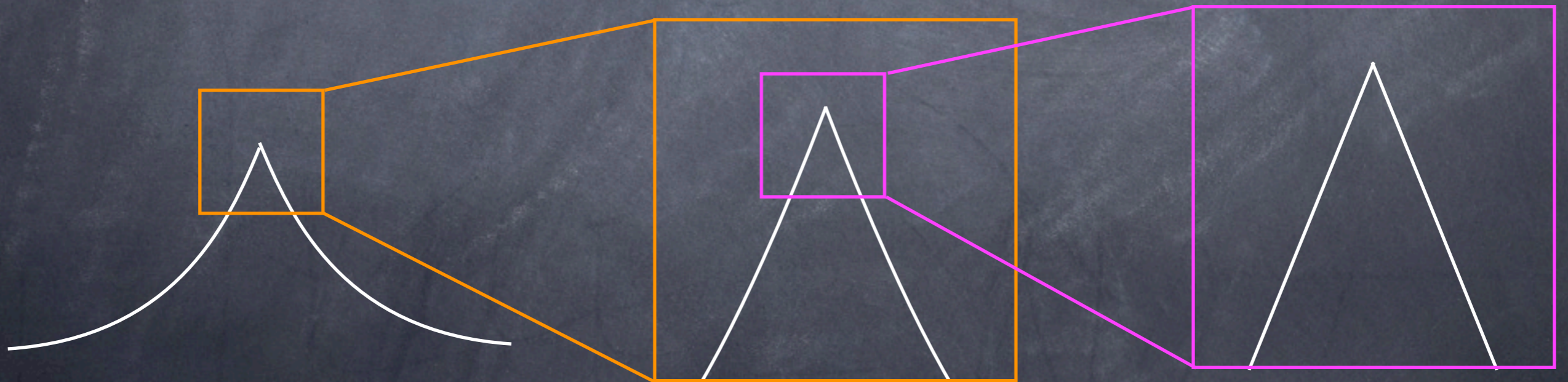
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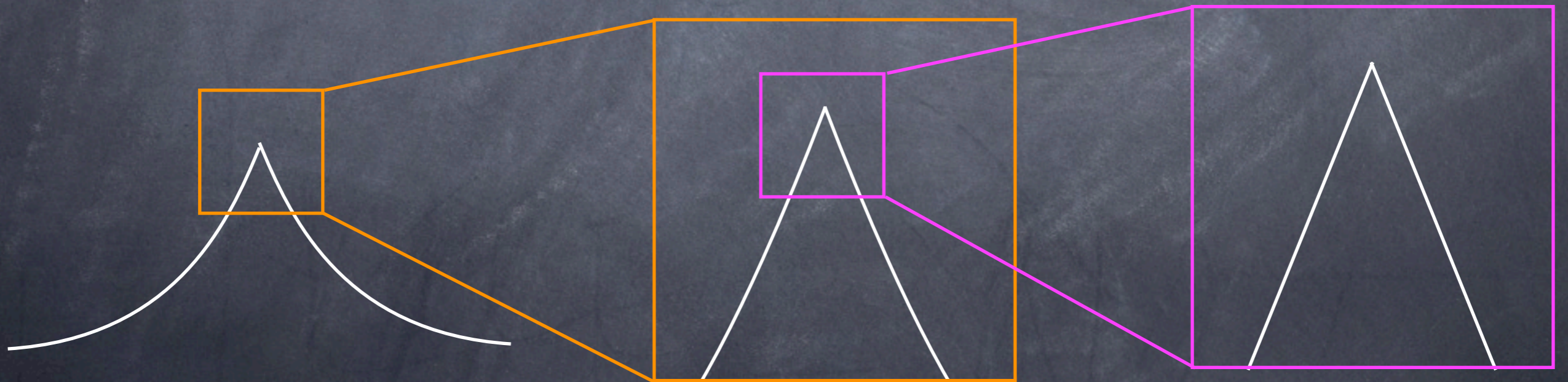
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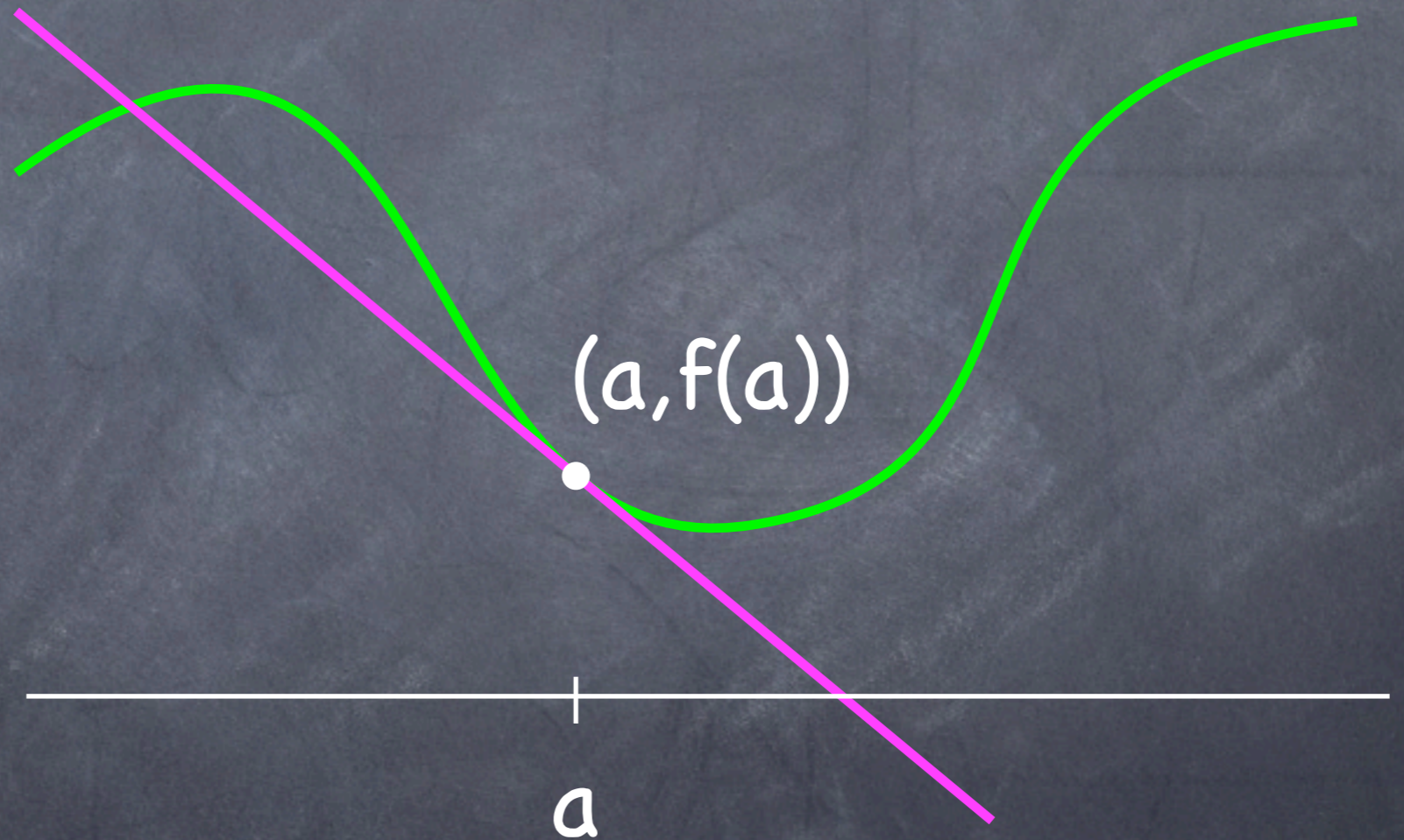
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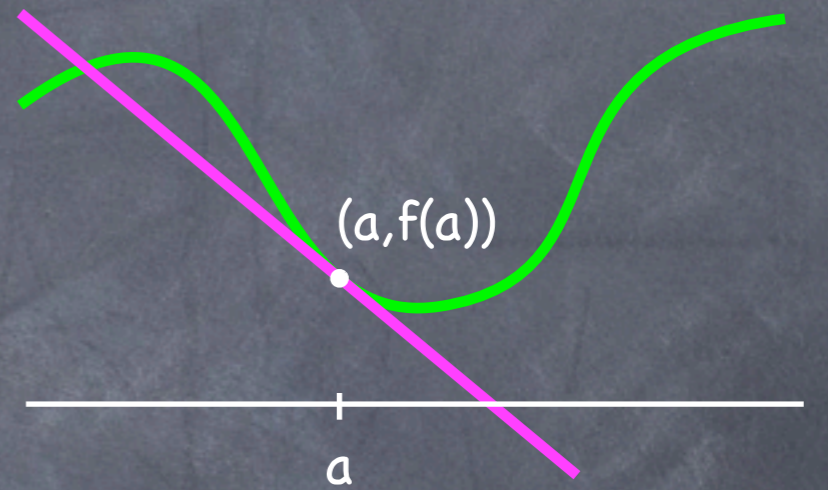
Spreadsheet example...

Find the tangent line to $f(x)$ at $(a, f(a))$.



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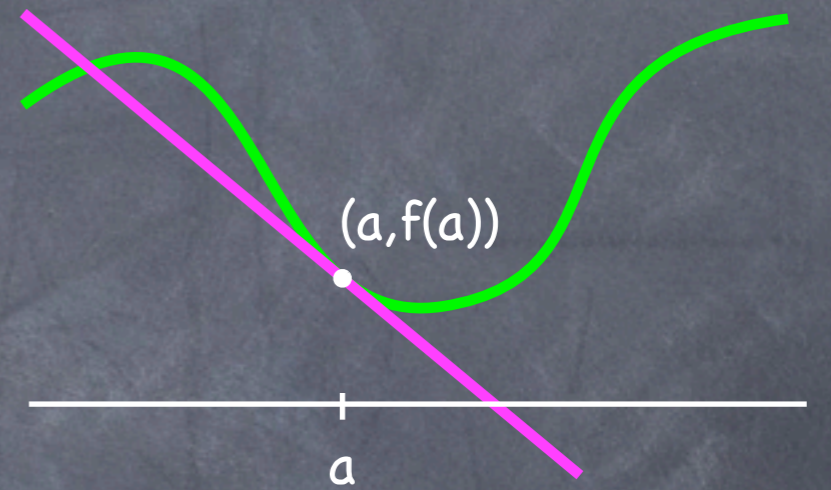
$$\frac{y - f(a)}{x - a} = f'(a)$$



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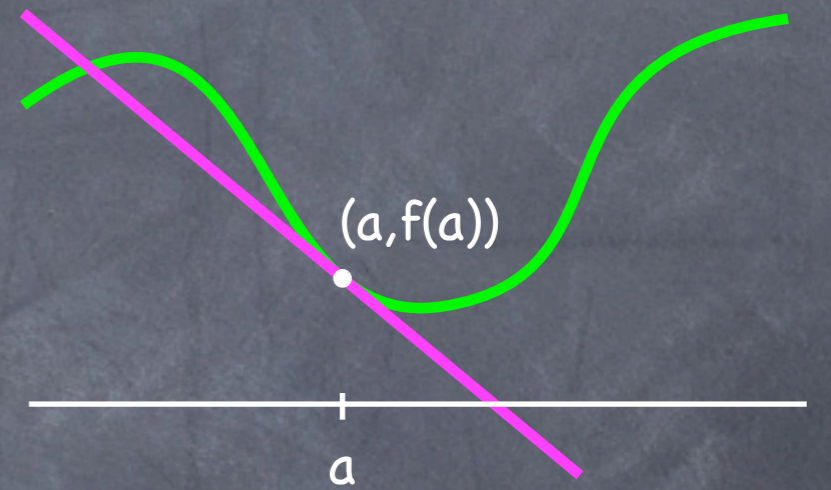
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$$y - f(a) = f'(a)(x - a)$$



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$$\frac{y - f(a)}{x - a} = f'(a)$$



$$y - f(a) = f'(a)(x - a)$$

$$y = f'(a)(x - a) + f(a)$$

Tangent line to $\sin(x)$ at $x=0$

- Slope of $\sin(x)$ at $x=0$ is 1.
- Goes through $(0,0)$.
- In general, tangent line: $y = m(x-x_0) + y_0$.
- In this case, $y = 1(x-0) + 0$, that is $y=x$.

Find the tangent line to the graph of a function $f(x)=x^2$ that goes through the point $(1,-1)$. Note $(1,-1)$ is not on the graph.

- We don't know the point on the graph so we just give it a name: a . Must find a !
- What is the tangent line at $x=a$?
 $y = f'(a)(x-a) + f(a)$.
- We know that $f(a) = a^2$, $f'(a) = 2a$ so the eq. of tangent line: $y = 2a(x-a)+a^2$.
- This line must go through $(1,-1)$ so that means $-1 = 2a(1-a)+a^2$. Solve for a !