1. What is the formula we found for the derivative of $\log_b(x)$?

we found $\left(\log_b(x)\right)' = \boxed{\dfrac{1}{\ln b} \cdot \dfrac{1}{x}}$

2. At what x coordinate on the graph of $y = \log_2(x)$ is the slope exactly 1?

we're being asked to find x for which $y'(x) = 1$, or, $\dfrac{1}{\ln 2} \cdot \dfrac{1}{x} = 1$

Solving for x gives $x = \dfrac{1}{\ln 2} \approx \dfrac{1}{.693} = 1.442\ldots$

[NOTE this problem is NOT asking "what's $y'(1)$." Its showing that $y'(1.442) = 1$. Put the 1 in the right place!]

3. Suppose $f'(a)$ exists for some function f. What is the "new, improved" formula we developed in class for approximating $f'(a)$?

when $f'(a)$ exists, then $\boxed{f'(a) \approx \dfrac{f(a+h) - f(a-h)}{2h}}$

(but be ware! it's possible that $\lim_{h \to 0} \dfrac{f(a+h) - f(a-h)}{2h}$ exists even if $f'(a)$ does NOT!

an example is $f(x) = |x|$ at $a = 0$. The point here is: only use this approximation when you already know $f'(a)$ exists)

4. What is the formula we've developed for $\dfrac{d}{dx}\, b^x$?

it's $(\ln b)\, b^x$

5. Using the answer to problem (4), what is the slope of the graph of the function $f(x) = 3.5^x$ at $a = 2.5$?

$f(x) = 3.5^x$

so $f'(x) = (\ln 3.5)\, 3.5^x$ and $f'(2.5) = (\ln 3.5)\, 3.5^{2.5} \approx \boxed{28.71038\ldots}$

6. Using $h = 0.01$, what is the approximation given by the formula in problem (3) to the answer to problem (5)?

It's $\dfrac{f(2.51) - f(2.49)}{2(0.01)} \approx \boxed{28.7111361}$