PROPERTIES OF EXPONENTIAL FCTS (59a)

$$f(x) = a^x$$

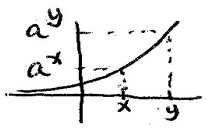
ALLOWABLE BASES: $a > 0$, $a \neq 1$ ← STRICT!

RANGE: $(0, \infty)$; $a^x > 0$ FOR ALL x

DOMAIN: $(-\infty, \infty)$; EXPONENTIAL FCTS ARE DEFINED EVERYWHERE

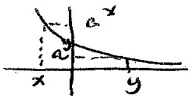
ONE-TO-ONE FCTS

FOR $a > 1$: INCREASING



$x < y$ IS EQUIVALENT TO $a^x < a^y$

FOR $0 < a < 1$: DECREASING



$x < y$ IS EQUIVALENT TO $a^x > a^y$

KEY PROPERTY OF EXPONENTIAL FCTS (59b)

$f(x) = 2^x$

x	2^x	
-2	$\frac{1}{4}$	$\Delta x = 1$, $\cdot 2$
-1	$\frac{1}{2}$	$\cdot 2$
0	1	$\cdot 2$
1	2	
2	4	
3	8	

$a = 2$
$\Delta x = 1$
$a^{\Delta x} = 2^1 = 2$

LET $f(x) = a^x$,

THEN $f(x+\Delta x) = a^{x+\Delta x}$

$= a^x a^{\Delta x}$

$= a^{\Delta x} \cdot f(x)$

↑ SCALING FACTOR

WHEN x CHANGES BY Δx

$(x, y) \longmapsto (x+\Delta x, a^{\Delta x} y)$

y GETS MULTIPLIED BY A SCALING FACTOR