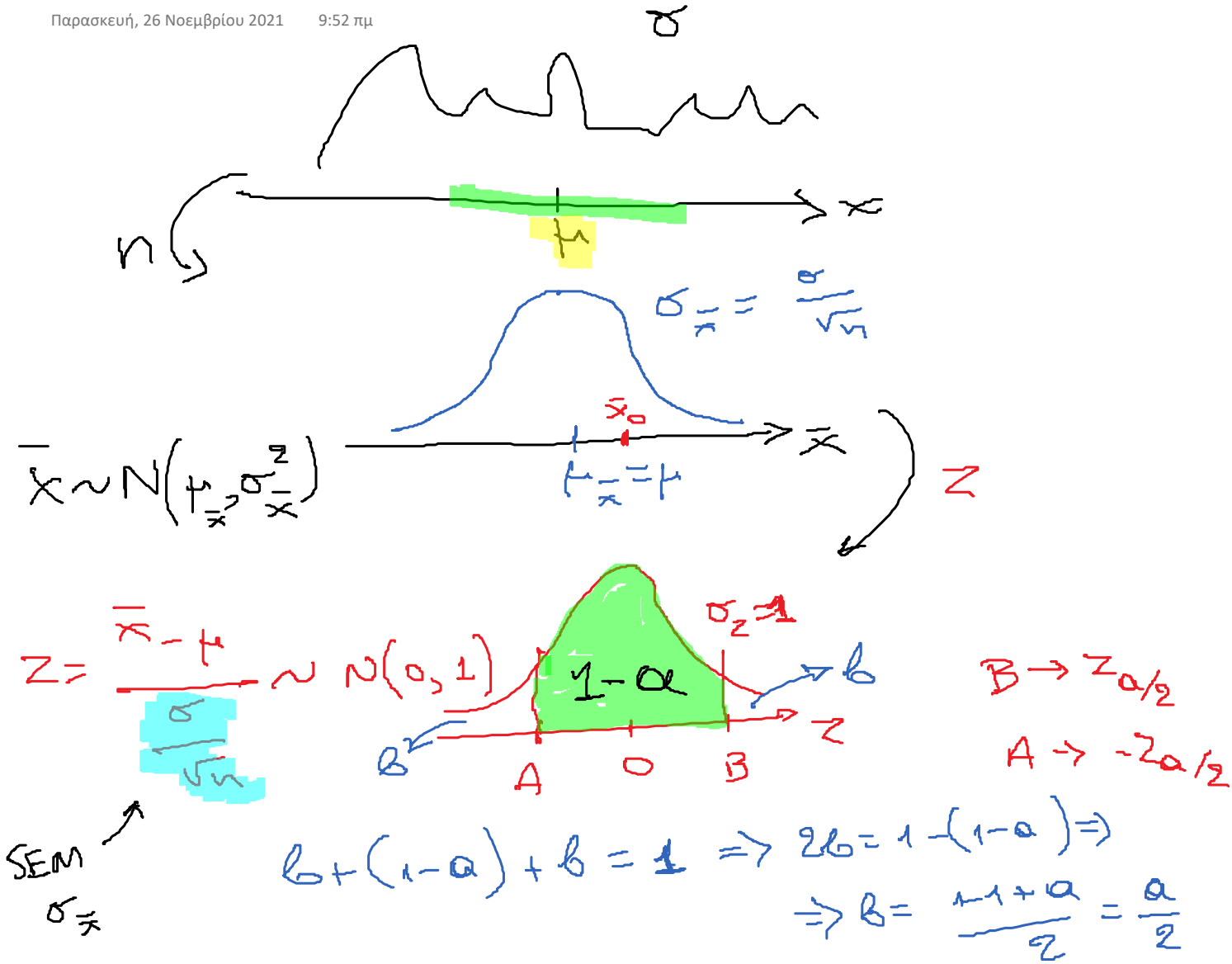

σ
n
x
μ
$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$
$\bar{x}_0$
$\mu_{\bar{x}} = \mu$
$\bar{x} \sim N(\mu_{\bar{x}}, \sigma^2_{\bar{x}})$
Z
$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} \sim N(0,1)$
SEM
$\sigma_{\bar{x}}$
$\sigma_z = 1$
1 - α
b
z
B
A
0
B → $z_{\alpha/2}$
A → $-z_{\alpha/2}$
$b + (1-\alpha) + b = 1 \Rightarrow 2b = 1 - (1-\alpha) \Rightarrow$
$\Rightarrow b = \frac{1-1+\alpha}{2} = \frac{\alpha}{2}$

$0,95 = 1-\alpha \Rightarrow \alpha = 0,05$

$n = 9$

$\bar{x} = 20$

$\sigma = \sigma_x = 4$

95% διάστημα εμπιστοσύνης μ

Lower limit $\quad \bar{x} - z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} = 20 - 1,96 \cdot \frac{4}{\sqrt{9}} = 20 - 2,613$

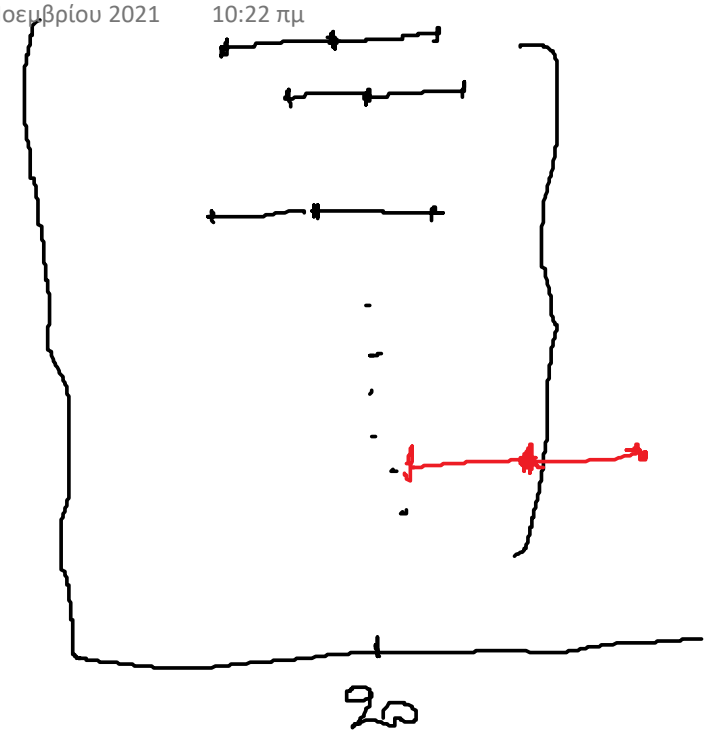
Upper —"— $\quad \bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}} = 20 + 1,96 \frac{4}{\sqrt{9}} = 20 + 2,613$

$\Longrightarrow (17,387 \; , \; 22,613)$

Επίπεδο εμπιστοσύνης (confidence level) = 90% $\Rightarrow 1-\alpha = 0,9$

$\alpha = 0,10$

$\Longrightarrow \left(20 - 1,645 \frac{4}{\sqrt{9}} \; , \; 20 + 1,645 \frac{4}{\sqrt{9}}\right)$



Experiment 1
2
3
.
.
.
1789

$$z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}} \leq \varepsilon \Rightarrow \frac{z^2 \sigma^2}{n} \leq \varepsilon^2 \Rightarrow n \geq \frac{z^2 \sigma^2}{\varepsilon^2}$$

$$n \geq \left(\frac{z_{\alpha/2} \sigma}{\varepsilon} \right)^2$$

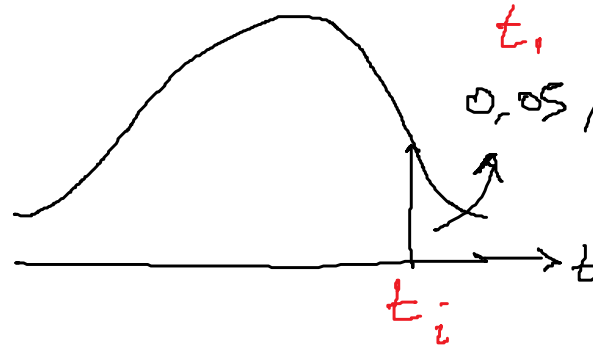
$x_1, x_2, \dots x_n \longrightarrow \bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

$n-1$: degrees of freedom

βαθμοί ελευθερίας

$$\frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} \sim t_{n-1}$$



t_1 t_2 t_3 t_4

0,05 / 0,01 / 0,025 / 0,005

$n-1 = 9$

Confidence level $100(1-\alpha)\% = 95\%$

$(\alpha = 0,05$

$\frac{\alpha}{2} = 0,025)$

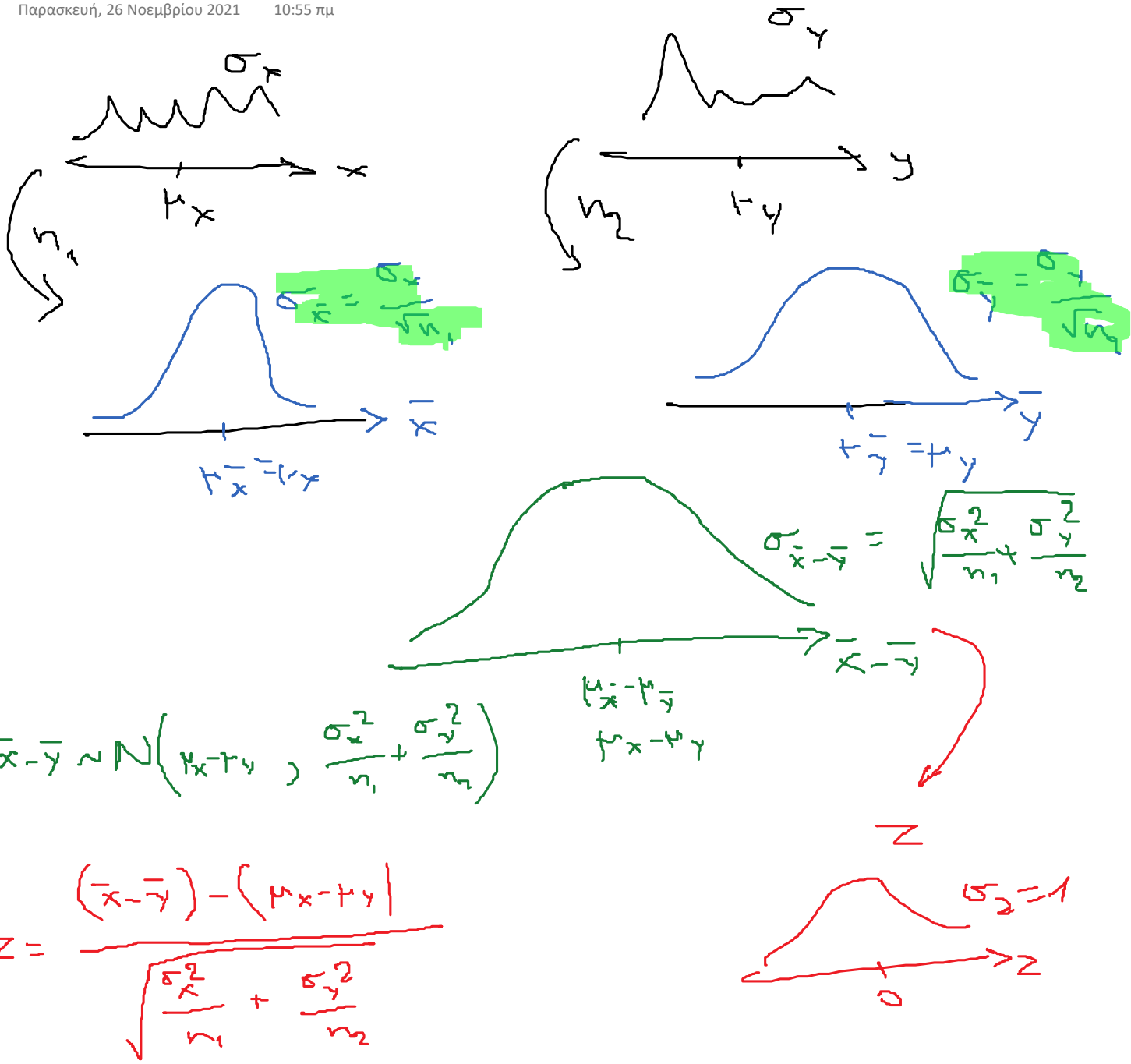
$$\bar{x} - t_{n-1,\frac{\alpha}{2}} \frac{s}{\sqrt{n}} < \mu < \bar{x} + t_{n-1,\frac{\alpha}{2}} \frac{s}{\sqrt{n}}$$

($z_{\alpha/2}$ above the left t, $z_{\alpha/2}$ above the right t)

$n=9 \quad , \bar{x}=20 \quad , s=4 \qquad t_{9-1,\frac{0,05}{2}} = 2,306$

$$\left(20 - 2,306\frac{4}{\sqrt{9}} \quad , 20 + 2,306\frac{4}{\sqrt{9}}\right)$$

$$(16,925 \quad , \quad 23,075)$$



$$\bar{x}-\bar{y} \sim N\left(\mu_x-\mu_y,\ \frac{\sigma_x^2}{n_1}+\frac{\sigma_y^2}{n_2}\right)$$

$$Z=\frac{(\bar{x}-\bar{y})-(\mu_x-\mu_y)}{\sqrt{\frac{\sigma_x^2}{n_1}+\frac{\sigma_y^2}{n_2}}}$$