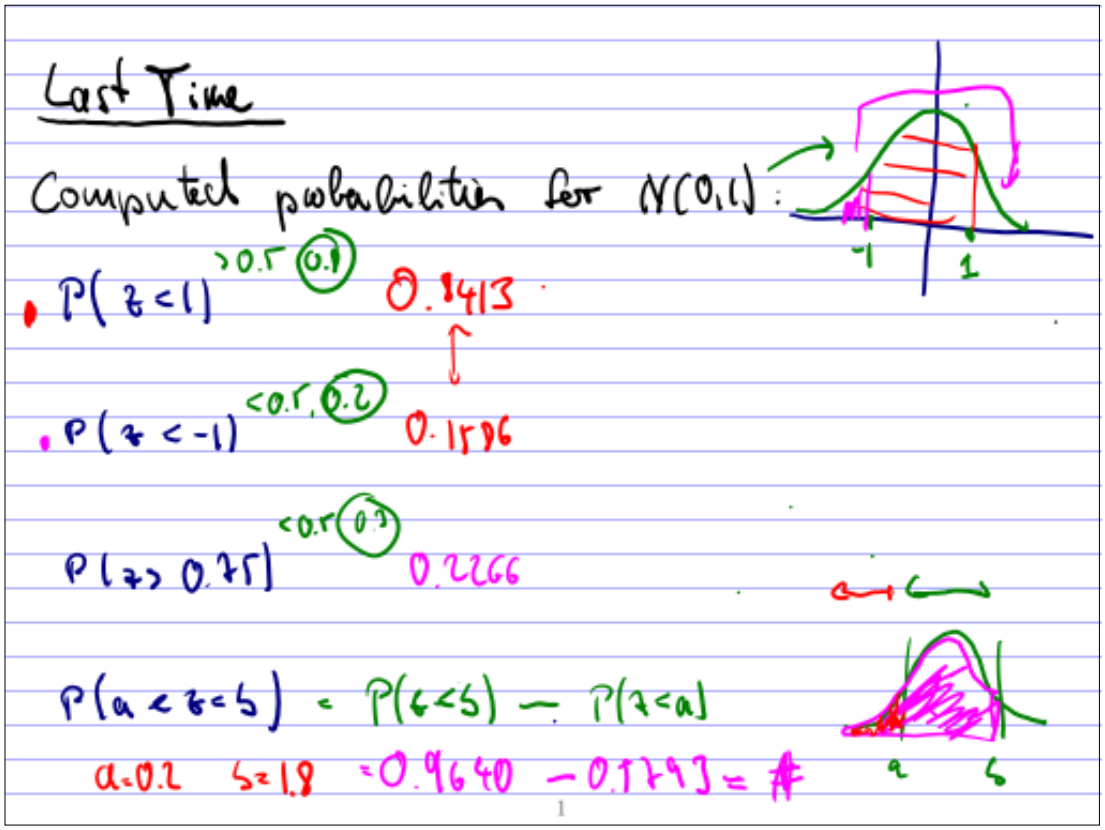
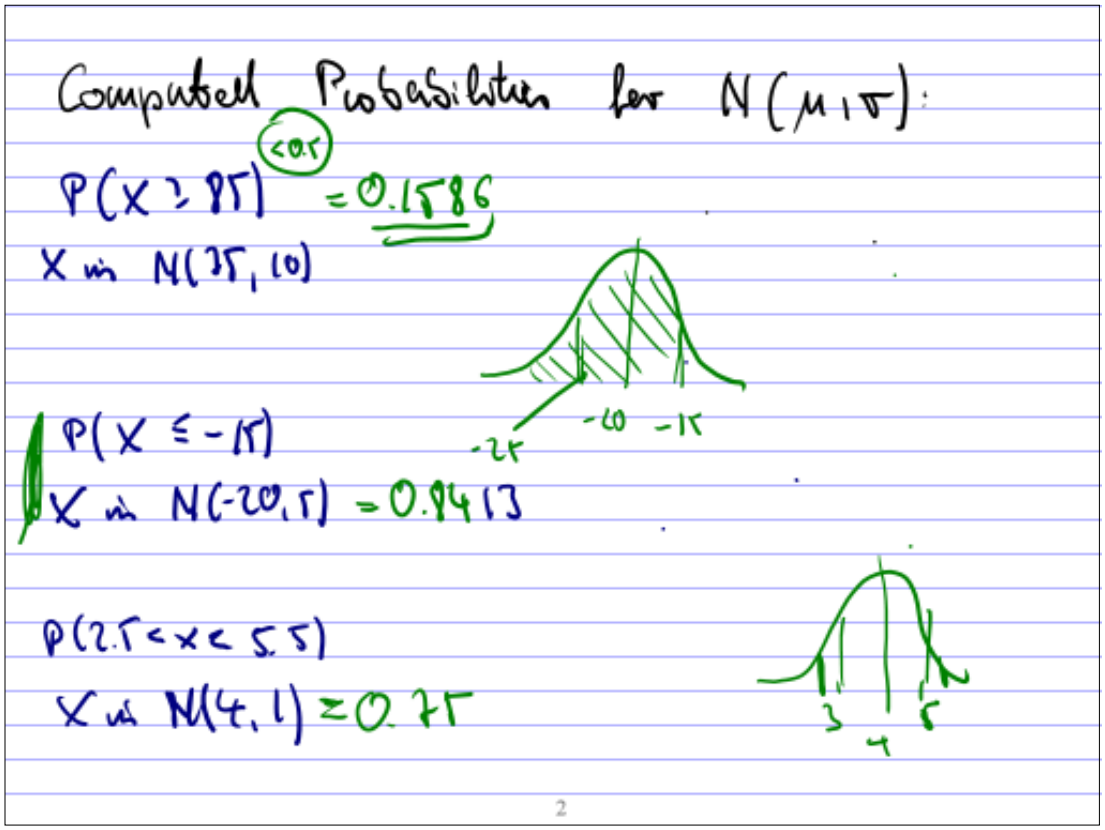
Panel 1



Panel 2



Panel 3

Convert X-score, X in $N(\mu, \sigma)$, to z-score, t in $N(0,1)$

$$z = \frac{x-\mu}{\sigma}$$

If X in $N(8,3)$, then

$$P(X > 10) = P(t > 0.6667)$$

X-score of 10 has a z-score of $\frac{10-8}{3} = \frac{2}{3} = 0.6667$

$P(X > 10) = 0.2525$

$P(t > 0.6667) = 0.2525$

Or Find z-score for $x = 10$

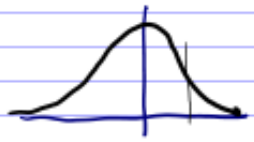
If X in $N(8,3)$: $z = 0.66$

3

Panel 4

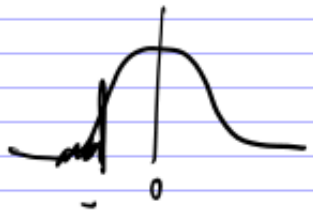
Reverse Probability $z_0 = 1.0364$

a) Find t_0 s.t. $P(t > t_0) = 0.15$



b) t_0 s.t. $P(t < t_0) = 0.05$

$t_0 = -1.645$



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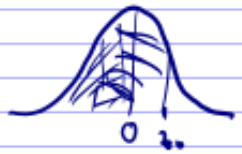
Panel 5

Find z_0 s.t. $P(z \in z_0) = 0.75$. Then find the equivalent x_0-value, $X = N(89, 12)$, i.e. find x_0 s.t. $P(x \in x_0) = 0.75$, $X = N(89, 12)$

1.)



$z_0 = 0.6745$

Know: $z = \frac{x-\mu}{\sigma}$

$\sigma z = x - \mu$

$\mu + \sigma z = x = 89 + 12 \cdot 0.6745 = 97.094$

97.0938 by using normal calc

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Panel 6

To convert x-score to z-score: $z = \frac{x-\mu}{\sigma}$

To convert z-score to x-score: $x = \mu + \sigma z$

Ex: Find prob. that a randomly selected adult in US is 57 years or older.

Know from GSS: AGE has $\bar{x} = 47.21$, $\sigma = 17.35$.

$\Rightarrow P(x \geq 57) = 0.2901$

$N(47.21, 17.35)$

This assumes that X is normal!!!

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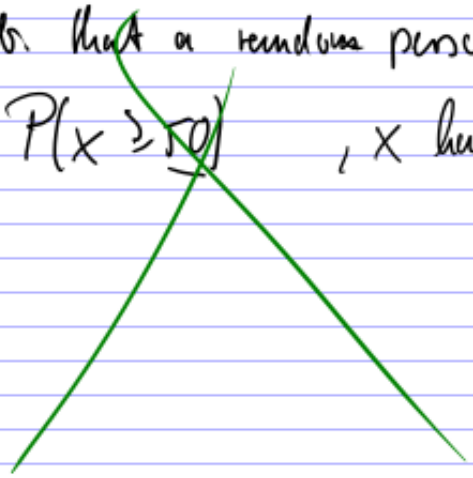
Panel 7

Prob. that a random person is 50 years or older.

$P(X \geq 50)$, X has $\mu = 47.71$, $\sigma = 17.35$



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Panel 8

Central Limit Theorem. Say we have a distribution of unknown shape. If we select samples of size N and compute the sample mean $\bar{x}$, they will have a normal distribution (approx).

If original distribution has mean μ and std. dev. σ, then the $\bar{x}$ are Normal with mean μ and std. dev. $\sigma/\sqrt{N}$, i.e.

$\bar{X}$ are $N(\mu, \frac{\sigma}{\sqrt{N}})$

↳ Standard Error

8

Panel 9

What is avg. mpg for US cars?

Survey cars, say $N = 400$, and check their mpg. Say I get sample mean $\bar{x} = 23.5$ and $s = 7.82$.

Do this again: $\bar{x} = 21.8$, $s = 7.99$

again $\bar{x} = 24.9$, $s = 8.01$

By CLT all samples are $N\left(\mu, \frac{\sigma}{\sqrt{N}}\right)$

Ex: Want to know $P(\# < \bar{x} < \#) = 0.9$

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