

Course: CS5961/6951
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Due: Fri, 18 Jan 2010

Computational Statistics

Sp 2011

Assignment: *Normal Distribution*

A. Suppose a certain demographic group G with age 51-61 years has *mean net worth* of $\mu = \$60,000$, with standard deviation $\sigma = \$20,000$. Assuming a normal distribution pertains, compute the *percentage* (%) of G that would be expected to have *net worth (NW)* such that :

- i. $\$60,000 \leq \mathbf{NW} \leq \$100,000$
- ii. $\$40,000 \leq \mathbf{NW} \leq \$120,000$
- i. $\$20,000 \leq \mathbf{NW} \leq \$140,000$

When solving this problem, transform the data into the standard normal \mathbf{z} statistic. For each range i), ii) and iii) above, recast the problem in terms of \mathbf{z} relative to the parameters of the standard normal distribution. That is, what ranges of \mathbf{z} correspond to above queries i), ii) and iii), respectively? Let the

normal probability density function be $f(t) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(t-\mu)^2}{2\sigma^2}}$, and $F(x) = \int_{-\infty}^x f(t)dt$ be the cumulative normal distribution function.

- i. $? \leq \mathbf{z} \leq ?$
- ii. $? \leq \mathbf{z} \leq ?$

iii. $? \leq \mathbf{z} \leq ?$

In writing up the answer, use some standard tool (*Excel*, *R*, etc) to evaluate the

normal probability density function $f(t) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(t-\mu)^2}{2\sigma^2}}$, and

$F(x) = \int_{-\infty}^x f(t)dt$, the cumulative normal distribution function. Show details.