PRINTABLE VERSION

Quiz 8

You scored 100 out of 100

Question 1

Your answer is CORRECT.

The length of time needed to complete a certain test is normally distributed with mean 92 minutes and standard deviation 8 minutes. Find the probability that it will take less than 80 minutes to complete the test.

a) 0.9666

b) 0.0334

c) 0.0668

d) 0.9332

e) 0.5000

f) None of the above

```
> pnorm(80, 92, 8)
[1] 0.0668072
>
```

Question 2

Your answer is CORRECT.

Costs for standard veterinary services at a local animal hospital follow a Normal distribution with a mean of $83 and a standard deviation of $21. What is the probability that one bill for veterinary services costs between $51 and $114?

a) 0.5669

b) 0.5000

c) 0.1337

d) 0.8663

e) 0.4331

f) None of the above

```
> pnorm(114,83,21) - pnorm(51,83,21)
[1] 0.8662755
>
```

Question 3

Your answer is CORRECT.

Suppose that x is normally distributed with a mean of 40 and a standard deviation of 15. What is $P(x \geq 52.45)$?

a) 0.203

b) 0.597

c) 0.207

d) 0.206

e) 0.297

f) None of the above

```
> 1 - pnorm(52.45,40,15)
[1] 0.2032694
>
```

Question 4

Your answer is CORRECT.

At a college the scores on the chemistry final exam are approximately normally distributed, with a mean of 75 and a standard deviation of 13. The scores on the calculus final are also approximately normally distributed, with a mean of 76 and a standard deviation of 12. A student scored 82 on the chemistry final and 82 on the calculus final. Relative to the students in each respective class, in which subject did the student do better?

a) The student did equally well in each course

b) Calculus

c) There is no basis for comparison

d) Chemistry

e) None of the above

(see slide 7 of lecture 11 slides for similar example)

Chemistry: $\mu = 75, \sigma = 13, X = 82$

Calculus: $\mu = 76, \sigma = 12, X = 82$

Using standard normal distribution: $Z = \frac{X - \mu}{\sigma}$

```
> chem = (82 - 75)/13
> calc = (82 - 76)/12
> chem
[1] 0.5384615
> calc
[1] 0.5
>
```

Question 5

Your answer is CORRECT.

Find a value of c so that $P(Z \leq c) = 0.47$.

a) 0.42

b) 0.08

c) −0.08

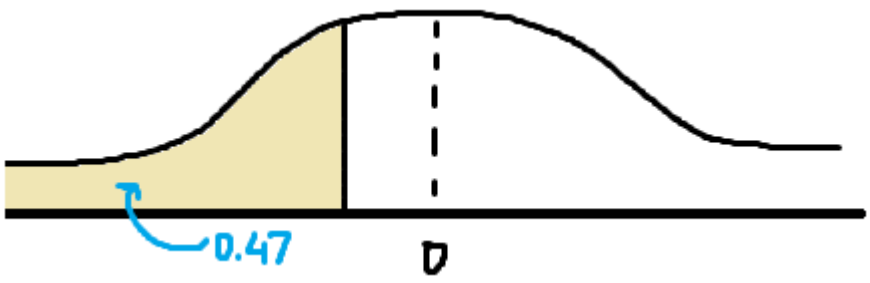
d) 1.08

e) 0.92

(see slide 20 of lecture 11 slides for similar example)

"standard" normal distribution, inverse normal will give everything to the left (i.e. less than) c

```
> qnorm(0.47)
[1] -0.07526986
>
```



f) None of the above

Question 6

Your answer is CORRECT.

Find a value of c so that P(Z ≥ c) = 0.43.

a) 0.02

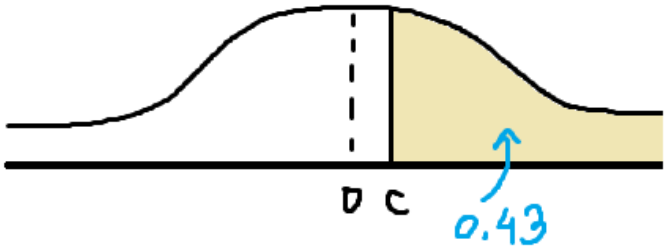
b) 0.18

c) 0.82

d) 0.35

e) −0.18

f) None of the above



Remember that inverse normal gives areas left of the z-scores, so we must input the area left of *c*. The total area under this curve is 1, so to find the left of *c* do 1 - 0.43, and put that into qnorm

```
> qnorm(1-0.43)
[1] 0.1763742
>
```

Question 7

Your answer is CORRECT.

What effect does decreasing the sample size have on a distribution of sample means?

a) It will not make any difference

b) It will have more variation

c) It will have less variation

Question 8

Your answer is CORRECT.

In a large population, 74% of the households have cable tv. A simple random sample of 100 households is to be contacted and the sample proportion computed. What is the mean and standard deviation of the sampling distribution of the sample proportions?

a) mean = 0.74, standard deviation = 0.0439

b) mean = 74.00, standard deviation = 0.0439

c) mean = 0.74, standard deviation = 0.7339

d) mean = 74.00, standard deviation = 0.0019

e) mean = 0.74, standard deviation = 0.0019

$\mu = p$

$\sigma = \sqrt{\frac{p(1-p)}{n}}$

$p = 0.74$

$n = 100$

```
> sqrt((0.74*(1-0.74))/100)
[1] 0.04386342
>
```

(see notes on sample proportions; slide 27 of lecture 12 slides)

f) None of the above

Question 9

Your answer is CORRECT.

In a large population, 95% of the households have cable tv. A simple random sample of 81 households is to be contacted and the sample proportion computed. What is the probability that the sampling distribution of sample porportions is less than 91%?

a) 0.9507

b) 0.0493

c) 0.6441

d) 0.3559

e) 0.0246

f) None of the above

$P(\hat{p} < 0.91)$

(Recall that binomial can be approximated with normal)

$\mu = 0.95$

$\sigma = \sqrt{\frac{(0.95)(1-0.95)}{81}}$

```
> sd = sqrt((0.95*(1-0.95))/81)
> pnorm(0.91,0.95,sd)
[1] 0.04928835
```

Question 10

Your answer is CORRECT.

Which of the following statements is not true?

a) The standard deviation of the sampling distribution of sample mean = $\sigma/\sqrt{n}$

b) The larger the sample size, the better will be the normal approximation to the sampling distribution of sample mean.

c) The sampling distribution of the sample mean is always reasonably like the distribution of X, the distribution from which the sample is taken.

d) The sampling distribution of sample mean is approximately normal, mound-shaped, and symmetric for $n > 30$ or $n = 30$.

e) The mean of the sampling distribution of sample mean is always the same as that of X, the distribution from which the sample is taken.

f) None of the above

Question 11

Your answer is CORRECT.

Suppose a random sample of 80 measurements is selected from a population with a mean of 25 and a variance of 200. Select the pair that is the mean and standard error of $\bar{x}$.

a) [25, 1.981]

b) [80, 1.681]

c) [25, 1.681]

d) [25, 1.581]

e) [25, 2.081]

f) None of the above

$\mu_{\bar{x}} = \mu = 25$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{\sqrt{Var}}{\sqrt{n}}$

```
> sqrt(200)/sqrt(80)
[1] 1.581139
>
```

Question 12

Your answer is CORRECT.

A random sample of 625 10-ounce cans of fruit nectar is drawn from among all cans produced in a run. Prior experience has shown that the distribution of the contents has a mean of 10 ounces and a standard deviation of .10 ounce. What is the probability that the mean contents of the 625 sample cans is less than 9.995 ounces?

a) 0.106

b) 0.146

c) 0.116

d) 0.156

e) 0.136

f) None of the above

According to the central limit theorem, if the sample size is above 30 the sample mean is approximately a normal distribution.

$\mu_{\bar{x}} = \mu = 10$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

```
> sd_mean = (0.10)/sqrt(625)
> pnorm(9.995, 10, sd_mean)
[1] 0.1056498
>
```

Question 13

Your answer is CORRECT.

Suppose that a random sample of size 36 is to be selected from a population with mean 47 and standard deviation 8. What is the approximate probability that $\bar{X}$ will be more than .5 away from the population mean?

a) 0.2923

b) 0.0498

c) 0.7077

d) 0.4923

e) 0.5847

By the central limit theorem is the sample size is greater than 30, the sample mean is approximately the normal distribution.

Since this is asking more than 0.5 away, you make sure its outside the range of -0.5, +0.5

$\mu_{\bar{x}} = \mu = 47$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

```
> sd_mean = 8/sqrt(36)
> 1 - (pnorm(47.5, 47, sd_mean) - pnorm(46.5, 47, sd_mean))
[1] 0.7076605
>
```

f) None of the above

Question 14

Your answer is CORRECT.

Lloyd's Cereal company packages cereal in 1 pound boxes (16 ounces). A sample of 81 boxes is selected at random from the production line every hour, and if the average weight is less than 15 ounces, the machine is adjusted to increase the amount of cereal dispensed. If the mean for 1 hour is 1 pound and the standard deviation is 0.2 pound, what is the probability that the amount dispensed per box will have to be increased?

a) 0.3773

b) 0.0025

c) 0.9975

d) 0.2025

e) 0.0049

f) None of the above

$n = 81 \qquad \mu_{\bar{x}} = 1 \text{ lb}$

$\sigma = 0.2 \text{ lb}$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

```
> sd_mean = (0.2)/sqrt(81)
> pnorm(15/16, 1, sd_mean)
[1] 0.002457901
>
```