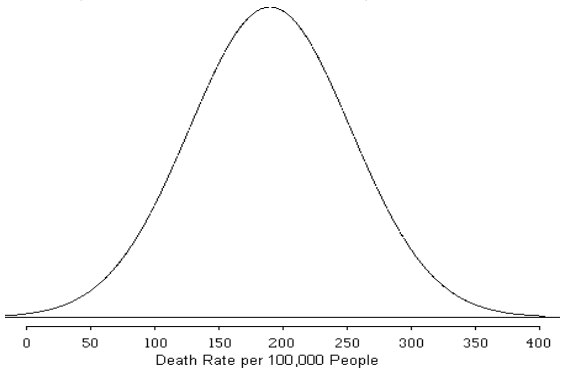
AP Statistics: Ch. 6 Practice Test

Part 1: Multiple Choice. ***WRITE*** *the* ***UPPER CASE letter*** *corresponding to the* ***best answer****.*

1) Which of these variables is least likely to have a Normal distribution?
A) Annual income for all 150 employees at a local high school
B) Lengths of 50 newly hatched pythons
C) Heights of 100 white pine trees in a forest
D) Amount of soda in 60 cups filled by an automated machine at a fast-food restaurant
E) Weights of 200 of the same candy bar in a shipment to a local supermarket

2) The proportion of observations from a standard Normal distribution that take values larger than -0.75 is about
A) 0.2266 B) 0.7704 C) 0.7734 D) 0.7764 E) 0.8023

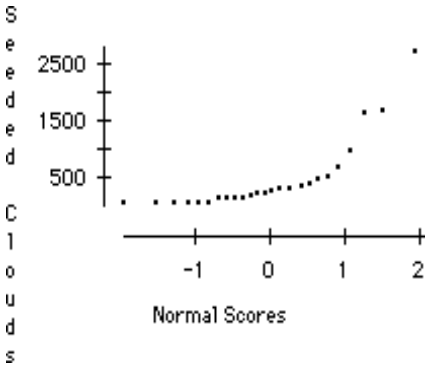
For #s 3-4: The distribution of heart disease death rates, per 100,000 people, in 19 developed Western countries is close to this Normal distribution.



3) The mean heart disease death rate per 100,000 people takes approximately what value?
A) 100 B) 150 C) 190
D) 250 E) 300

4) The standard deviation of the heart disease rate per 100,000 people is approximately what value?
A) 10 B) 25 C) 60 D) 100 E) 250

5) The following graph is a Normal probability plot for the amount of rainfall (in acre-feet) obtained from 26 randomly selected clouds that were seeded with silver oxide. Which of the following statements about the shape of the rainfall distribution is true?
A) The distribution is Normal.
B) The distribution is approximately Normal.
C) The distribution is roughly symmetric.
D) The distribution has no potential outliers.
E) The distribution is skewed.



6) The distribution of the heights of students in a large class is roughly Normal. Moreover, the average height is 68 inches, and approximately 95% of the heights are between 62 and 74 inches. Thus, the standard deviation of the height distribution is approximately equal to
A) 2 B) 3 C) 6 D) 9 E) 12

7) If a store runs out of advertised material during a sale, customers become upset, and the store loses not only the sale but also goodwill. From past experience, a music store finds that the mean number of CDs sold in a sale is 845, the variance is 225, and a histogram of the demand is approximately Normal. The manager is willing to accept a 2.5% chance that a CD will be sold out. About how many CDs should the manager order for an upcoming sale?
A) 1295 B) 1070 C) 935 D) 875 E) 860

8) The distribution of actual weights of 8-ounce chocolate bars produced by a certain machine is normal with a mean of 8.1 ounces and a standard deviation of 0.1 ounces. What weight should be listed on each chocolate bar wrapper so that only 1% of all bars are underweight?
A) 7.77 ounces B) 7.87 ounces C) 8.00 ounces D) 8.23 ounces E) 8.33 ounces

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Use the following to answer questions **9** and **10**:

The distribution of actual weights of 8.0-ounce chocolate bars produced by a certain machine is normal with a mean of 8.1 ounces and a standard deviation of 0.1 ounces.

9) The proportion of chocolate bars weighing less than 8.0 ounces is
A) 0.159 B) 0.341 C) 0.500 D) 0.659 E) 0.841

10) The proportion of chocolate bars weighing between 8.2 and 8.3 ounces is
A) 0.819 B) 0.636 C) 0.477 D) 0.136 E) 0.022

11) The area under the standard Normal curve corresponding to $-0.3 < z < 1.6$ is
A) 0.3273 B) 0.4713 C) 0.5631 D) 0.9542 E) none of the above

12) A Normal density curve has which of the following properties?
A) It is symmetric.
B) It has a peak centered above its mean.
C) The spread of the curve is proportional to it standard deviation.
D) All of the properties (a) to (c) are correct.
E) None of the properties (a) to (c) is correct.

13) Many professional schools require applicants to take a standardized test. Suppose that 1,000 students take the test, and you find that your mark of 63 (out of 100) is the 73rd percentile. This means that
A) at least 73% of the people scored 63 or better.
B) at least 270 people scored 73 or better.
C) at least 730 people scored 73 or better.
D) at least 27% of the people scored 73 or worse.
E) at least 270 people scored 63 or better.

14) The yield of a variety of wheat was measured on a series of small plots and was found to be approximately Normal. The 2nd and 98th percentile were found to be 29 bushels/acre and 41 bushels/acre respectively. The standard deviation (bushels/acre) is approximately
A) 12 B) 6 C) 4 D) 3 E) 2

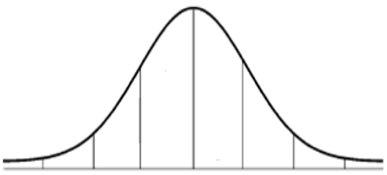
Part 2: FREE RESPONSE

For questions that require computation, *Show your work in a clear and organized manner*. BOX the final answers. NO WORK, NO CREDIT.

1) The length of pregnancies from conception to natural birth among a certain female population is Normally distributed with mean 270 days and standard deviation 10 days.

(a) According to the 68–95–99.7 rule, what percent of pregnancies last more than 300 days?

(b) How short must a pregnancy be in order to fall in the shortest 10% of all pregnancies?



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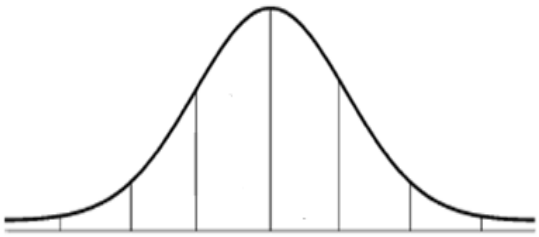
2) Raw scores on behavioral tests are often transformed for easier comparison. A test of reading ability has mean 75 and standard deviation 10 when given to third-graders. Sixth-graders have mean score 82 and standard deviation 11 on the same test.

(a) David is a third-grade student who scores 78 on the test. Nancy is a sixth-grade student who scores 81. Calculate the ***z***-score for each student. Who scored higher within his or her grade?

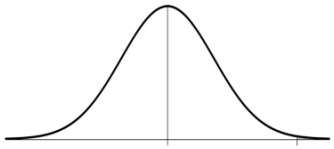
(b) Suppose that the distribution of scores in each grade is Normal. Determine the percentiles for David and Nancy. Interpret your results in context.

3) When Tiger Woods is on the driving range, the distance that golf balls travel when he hits them with a driver follows a Normal distribution with mean 310 yards and standard deviation 8 yards.

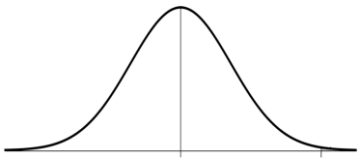
(a) Sketch the distribution of Tiger Woods's drive distances. Label the points one, two, and three standard deviations from the mean.



(b) What proportion of Tiger's drives travel between 300 and 325 yards? Shade the appropriate area under the curve you drew in (a).



(c) Find the 33rd percentile of Tiger's drive distance distribution.



Name: **Date:** **Period:** **ANSWER KEY**

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normalcdf (-.75, 1000, 0, 1) = 0.7734

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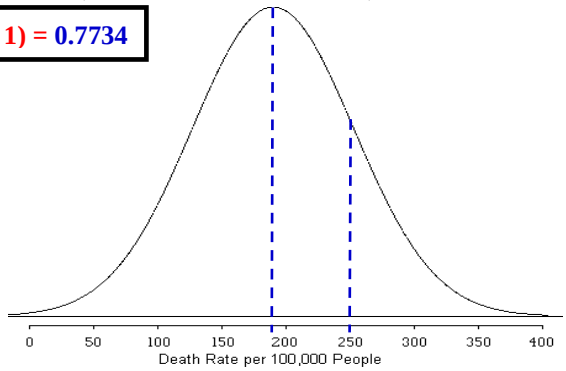

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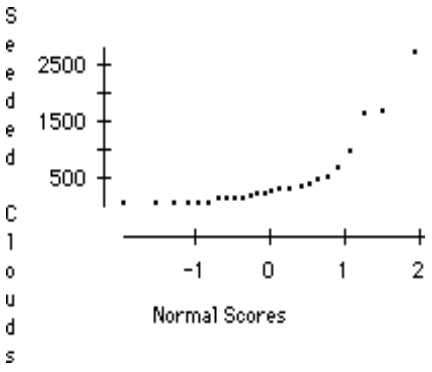

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normalcdf (-1000, 8,8.1,0.1) = 0.1587

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normalcdf (8.2, 8.3, 8.1, 0.1) = 0.1359

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normalcdf (-0.3, 1.6, 0, 1) = 0.5631

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D) at least 27% of the people scored 73 or worse.
E) at least 270 people scored 63 or better.

Upper tail is 27% ⇒ 0.27 × 1000 = 270

14) The yield of a variety of wheat was measured on a series of small plots and was found to be approximately Normal. The 2nd and 98th percentile were found to be 29 bushels/acre and 41 bushels/acre respectively. The standard deviation (bushels/acre) is approximately

A) 12 B) 6 C) 4 **D) 3** E) 2

Area between 2nd and 98th percentile = 0.96. Using the Empirical Rule, that's around the middle 95% (within 2 std. dev.). Mean = 35. ⇒ (41 – 35) / 2 = 3

Part 2: FREE RESPONSE

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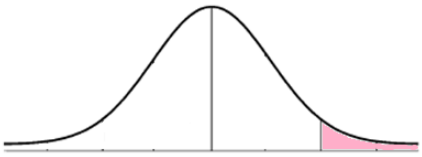
1) The length of pregnancies from conception to natural birth among a certain female population is Normally distributed with mean 270 days and standard deviation 10 days.

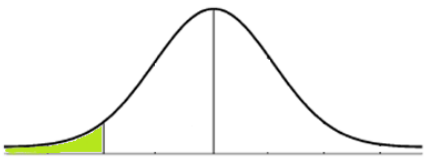
(a) According to the 68–95–99.7 rule, what percent of pregnancies last more than 300 days?

Upper tail of 99.7% ⇒ 0.15%



(b) How short must a pregnancy be in order to fall in the shortest 10% of all pregnancies?

The shortest 10% of pregnancies would fall at the 10th percentile, which corresponds to $z = -1.28$. The corresponding pregnancy length is 257.2 days.



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(a) David is a third-grade student who scores 78 on the test. Nancy is a sixth-grade student who scores 81. Calculate the ***z***-score for each student. Who scored higher within his or her grade?

$z_{david} = \frac{78-75}{10} = 0.30$ $z_{nancy} = \frac{81-82}{11} = -0.09$

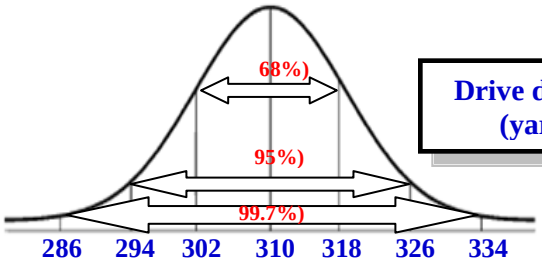
David scored higher within his grade.

(b) Suppose that the distribution of scores in each grade is Normal. Determine the percentiles for David and Nancy. Interpret your results in context.

David's percentile: 61.79, Nancy's percentile: 46.41
David's reading ability score is at or above 61.79% of third-graders who took this test. Nancy's reading ability score is at or above 46.41% of sixth-graders who took this test.

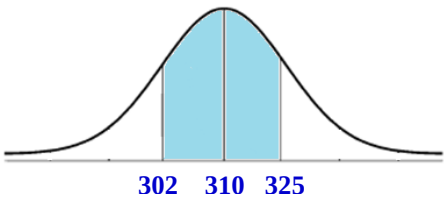
3) When Tiger Woods is on the driving range, the distance that golf balls travel when he hits them with a driver follows a Normal distribution with mean 310 yards and standard deviation 8 yards.

(a) Sketch the distribution of Tiger Woods's drive distances. Label the points one, two, and three standard deviations from the mean.



Drive distance (yards)

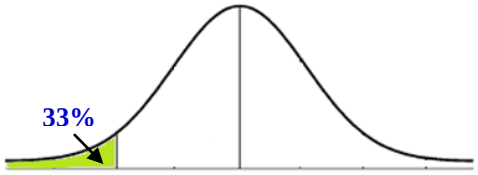
(b) What proportion of Tiger's drives travel between 300 and 325 yards? Shade the appropriate area under the curve you drew in (a).



Normalcdf (300, 325, 310, 8) = 0.8640

Tiger's drive travel between 300 and 325 yards is 86.40%.

(c) Find the 33rd percentile of Tiger's drive distance distribution.



InvNorm (0.33, 310, 8) = 306.48

Tiger's corresponding drive distance is 306.48 yards.