

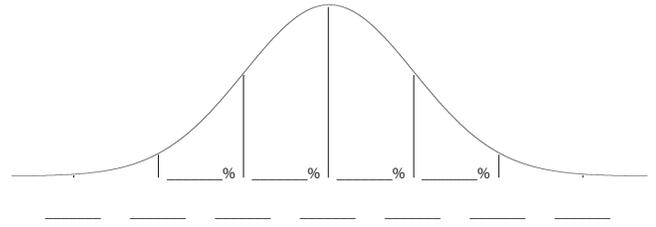
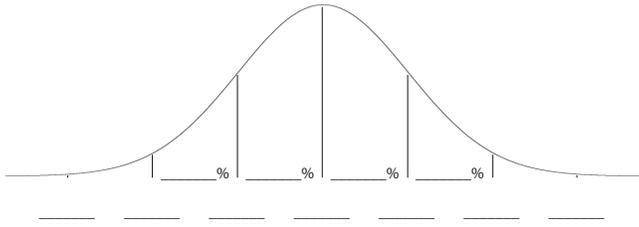
Name: _____

6-A Graphs of Normal Probability Distributions

1. In each curve, fill in the blanks for a normal distribution using the parameters provided.

a) IQ tests have a mean of $\mu = 100$ with $\sigma = 15$.

b) In Ryan's ant colony, the mean weight is $\mu = 460$ mg with $\sigma = 110$ mg.



2. Use the curves above to answer the following questions.

a) What percent of people have IQ's between 85 and 115?

b) What is the probability that a random person has an IQ between 85 and 115?

c) What is the probability that a random one of Ryan's ants weighs more than 460 milligrams?

d) Approximately what percentage of Ryan's ants weigh between 405 and 460 milligrams?

6-B Normal Probabilities

3. Convert the following raw scores into z scores using the parameters given in #1.

a) an IQ of 100

b) an IQ of 112

c) an ant weighing 330 milligrams

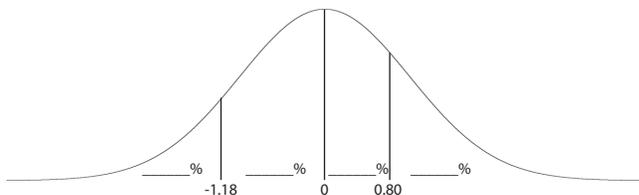
4. Find the area under the normal curve below the given z value.

a) $z = 0.00$

b) $z = 0.80$

c) $z = -1.18$

5. Fill in each blank in the normal curve below. Verify that the total area is 100%.



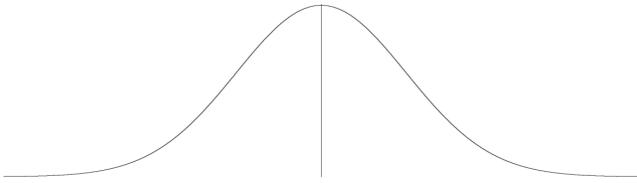
6. Calculate the following probabilities.

a) $P(-1.18 \leq z \leq 0.80)$

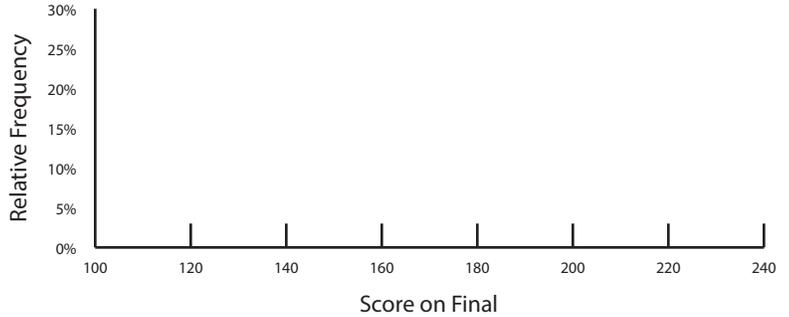
b) $P(z > 0.80)$

c) $P(z > -1.18)$

7. Label and shade the normal curve below to represent $P(105 \leq x \leq 126)$ for IQ scores, and then calculate what percentage of people have an IQ between 105 and 126.



8. Last semester's PreCalculus final scores were 106, 111, 114, 114, 117, 123, 123, 123, 126, 126, 131, 132, 135, 135, 136, 137, 138, 141, 144, 144, 145, 147, 150, 150, 150, 153, 153, 153, 153, 155, 156, 156, 160, 162, 162, 165, 168, 171, 171, 174, 174, 174, 180, 180, 180, 183, 186, 186, 189, 195, 198, 198, 204, 213, 216, 216, and 222. The mean was 158 and the standard deviation was 29.



- Count the number of scores in each category. List these numbers in the "O" (observed) column.
- Divide each of the observed values by 57 to calculate relative frequencies, and make a relative frequency histogram of the data.
- Calculate the z scores. List these numbers in the "z" column.
- Fill the x values and the z values from the first two columns into the blanks in the third column.
- Look up the area under the normal curve below each z value, and fill in the blanks in the third column to subtract and find the area under the normal curve between each z score and the next.
- Calculate the sum of the areas calculated in the third column. If it is not almost exactly 1.0000, try to find the error.
- For each of the areas calculated above, plot a point at that height on the histogram in the middle of the class of that area. Connect these points in a normal curve that peaks at $x = 158$.
- Multiply the areas calculated in the third column by the 57 students to find the expected number of students in each range. List these numbers in the "E" (expected) column.
- For each range, calculate observed minus expected to see how different the actual results were from a normal curve. List these differences in the $O - E$ column.
- How closely do these test results seem to follow a normal distribution?

x	z	area under normal curve between z and next lower boundary	O	E	$O - E$
$x = 100$	$z = \frac{100 - 158}{29} = -2.00$	$P(x < 100) = P(z < -2.00) = .0228$	0	$.0228(57) \approx 1$	1
$x = 120$	$z = \frac{120 - 158}{29} = -1.31$	$P(100 < x < 120) = P(-2.00 < z < -1.31) = .0951 - .0228 = .0723$	5	$.0723(57) \approx 4$	1
$x = 140$	$z = \frac{140 - 158}{29} = -0.62$	$P(120 < x < 140) = P(-1.31 < z < -0.62) = .2676 - .0951 = .1725$	_____	$.1725(57) \approx$ _____	_____
$x = 160$	$z = \frac{160 - 158}{29} = 0.07$	$P(140 < x < 160) = P(-0.62 < z < 0.07) =$ _____ $- .2676 =$ _____	_____	_____ $(57) \approx$ _____	_____
$x = 180$	$z = \frac{180 - 158}{29} =$ _____	$P(160 < x < 180) = P(_____ < z < _____) =$ _____ $-$ _____ $=$ _____	_____	_____ $(57) \approx$ _____	_____
$x = 200$	$z = \frac{200 - 158}{29} =$ _____	$P(_____ < x < _____) = P(_____ < z < _____) =$ _____ $-$ _____ $=$ _____	_____	_____ $(57) \approx$ _____	_____
$x = 220$	$z = \frac{220 - 158}{29} =$ _____	$P(_____ < x < _____) = P(_____ < z < _____) =$ _____ $-$ _____ $=$ _____	_____	_____ $(57) \approx$ _____	_____
		$P(220 < x < \text{_____}) = P(_____ < z < \text{_____}) = 1.0000 -$ _____ $=$ _____	_____	_____ $(57) \approx$ _____	_____

