

# Honors Algebra II

## Notes Section 6.3

### Use Normal Distributions

**Normal Distribution** a probability distribution that is modeled by a bell-shaped curve.

**Normal Curve:** bell-shaped curve that is symmetric about the mean.

**Standard Normal Distribution:** normal distribution with mean 0 and standard deviation 1.

**Mean:** average;  $\bar{x}$

**Standard Deviation:**  $\sigma$ ; the typical difference between a data value and the mean.

**z-score:** the number of standard deviations the x-value lies above or below the mean x.

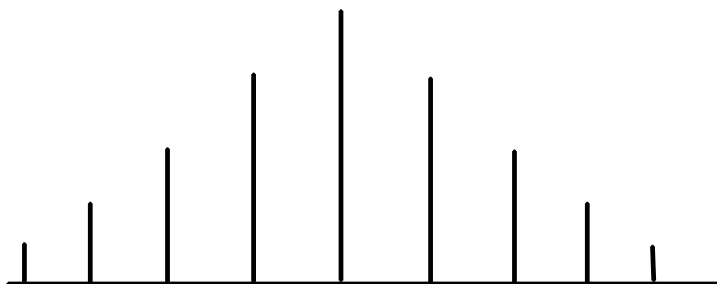
$$z = \frac{x - \bar{x}}{\sigma}$$

**EXAMPLE 1** A normal distribution has mean  $\mu$  and standard deviation  $\sigma$ . For a randomly selected x-value from the distribution, find  $P(\bar{x} - 2\sigma \leq x \leq \bar{x})$ .

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**EXAMPLE 2** The blood cholesterol readings for a group of women are normally distributed with a mean of 172 mg/dl and a standard deviation of 14 mg/dl.

a) About what percent of the women have readings between 158 and 186?



b) Readings less than 158 are considered desirable. About what percent of the readings are desirable?

**EXAMPLE 3** Scientists conducted aerial surveys of a seal sanctuary and recorded the number  $x$  of seals they observed during each survey. The numbers of seals observed were normally distributed with a mean of 73 seals and a standard deviation of 14.1 seals. Find the probability that a most 50 seals were observed during a survey.

a) Find the z-score corresponding to an x-value of 50

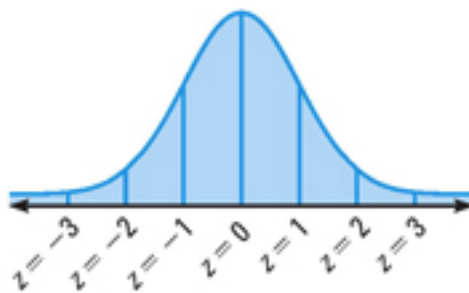
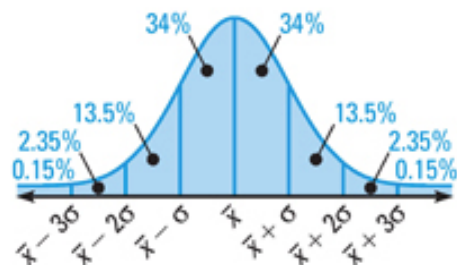
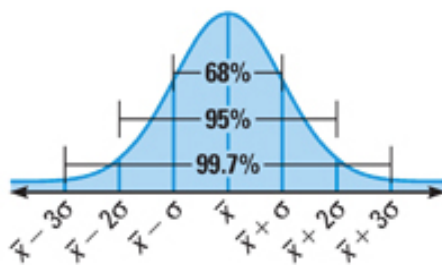
b) Use the table to find  $P(x \leq 50) = P(z \leq \quad)$

$z$	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
-3	.0013	.0010	.0007	.0005	.0003	.0002	.0002	.0001	.0001	.0000+
-2	.0228	.0179	.0139	.0107	.0082	.0062	.0047	.0035	.0026	.0019
-1	.1587	.1357	.1151	.0968	.0808	.0668	.0548	.0446	.0359	.0287
-0	.5000	.4602	.4207	.3821	.3446	.3085	.2743	.2420	.2119	.1841
0	.5000	.5398	.5793	.6179	.6554	.6915	.7257	.7580	.7881	.8159

### Areas Under a Normal Curve

A normal distribution with mean  $\bar{x}$  and standard deviation  $\sigma$  has the following properties:

- The total area under the related normal curve is 1.
- About 68% of the area lies within 1 standard deviation of the mean.
- About 95% of the area lies within 2 standard deviations of the mean.
- About 99.7% of the area lies within 3 standard deviations of the mean.



Standard Normal Table										
z	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
-3	.0013	.0010	.0007	.0005	.0003	.0002	.0002	.0001	.0001	.0000+
-2	.0228	.0179	.0139	.0107	.0082	.0062	.0047	.0035	.0026	.0019
-1	.1587	.1357	.1151	.0968	.0808	.0668	.0548	.0446	.0359	.0287
-0	.5000	.4602	.4207	.3821	.3446	.3085	.2743	.2420	.2119	.1841
0	.5000	.5398	.5793	.6179	.6554	.6915	.7257	.7580	.7881	.8159
1	.8413	.8643	.8849	.9032	.9192	.9332	.9452	.9554	.9641	.9713
2	.9772	.9821	.9861	.9893	.9918	.9938	.9953	.9965	.9974	.9981
3	.9987	.9990	.9993	.9995	.9997	.9998	.9998	.9999	.9999	1.0000-