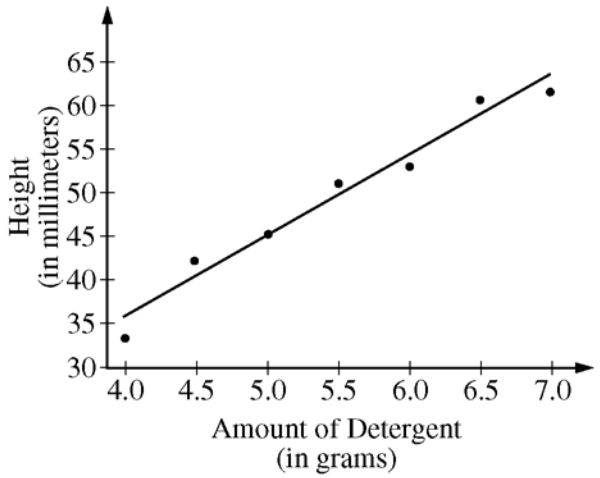
2. A manufacturer of dish detergent believes the height of soapsuds in the dishpan depends on the amount of detergent used. A study of the suds' heights for a new dish detergent was conducted. Seven pans of water were prepared. All pans were of the same size and type and contained the same amount of water. The temperature of the water was the same for each pan. An amount of dish detergent was assigned at random to each pan, and that amount of detergent was added to the pan. Then the water in the dishpan was agitated for a set amount of time, and the height of the resulting suds was measured.

   A plot of the data and the computer output from fitting a least squares regression line to the data are shown below.



Predictor	Coef	SE Coef	T	P
Constant	−2.679	4.222	−0.63	0.554
Amount	9.5000	0.7553	12.58	0.000

S = 1.99821 R–Sq = 96.9% R–Sq(adj) = 96.3%

(a) Write the equation of the fitted regression line. Define any variables used in this equation.

(b) Note that $s = 1.99821$ in the computer output. Interpret this value in the context of this study.

(c) Identify and interpret the standard error of the slope.

© 2006 The College Board. All rights reserved.
Visit apcentral.collegeboard.com (for AP professionals) and www.collegeboard.com/apstudents (for students and parents).

GO ON TO THE NEXT PAGE.

3. The depth from the surface of Earth to a refracting layer beneath the surface can be estimated using methods developed by seismologists. One method is based on the time required for vibrations to travel from a distant explosion to a receiving point. The depth measurement (M) is the sum of the true depth (D) and the random measurement error (E). That is, $M = D + E$. The measurement error (E) is assumed to be normally distributed with mean 0 feet and standard deviation 1.5 feet.

   (a) If the true depth at a certain point is 2 feet, what is the probability that the depth measurement will be negative?

   (b) Suppose three independent depth measurements are taken at the point where the true depth is 2 feet. What is the probability that <u>at least one</u> of these measurements will be negative?

   (c) What is the probability that the <u>mean</u> of the three independent depth measurements taken at the point where the true depth is 2 feet will be negative?

4. Patients with heart-attack symptoms arrive at an emergency room either by ambulance or self-transportation provided by themselves, family, or friends. When a patient arrives at the emergency room, the time of arrival is recorded. The time when the patient's diagnostic treatment begins is also recorded.

   An administrator of a large hospital wanted to determine whether the mean wait time (time between arrival and diagnostic treatment) for patients with heart-attack symptoms differs according to the mode of transportation. A random sample of 150 patients with heart-attack symptoms who had reported to the emergency room was selected. For each patient, the mode of transportation and wait time were recorded. Summary statistics for each mode of transportation are shown in the table below.

Mode of Transportation	Sample Size	Mean Wait Time (in minutes)	Standard Deviation of Wait Times (in minutes)
Ambulance	77	6.04	4.30
Self	73	8.30	5.16

   (a) Use a 99 percent confidence interval to estimate the difference between the mean wait times for ambulance-transported patients and self-transported patients at this emergency room.

   (b) Based only on this confidence interval, do you think the difference in the mean wait times is statistically significant? Justify your answer.

© 2006 The College Board. All rights reserved.
Visit apcentral.collegeboard.com (for AP professionals) and www.collegeboard.com/apstudents (for students and parents).