

Warm-Up 13

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1 Formula Area

1. Normal distribution PDF: $p(x) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left(-\frac{1}{2}(x - \mu)^2/\sigma^2\right)$
2. The *z-score* of a particular event x drawn from a normal distribution is $z = (x - \mu)/\sigma$.
3. Probabilities for a normal distribution: $p(-1\sigma < x < 1\sigma) = 0.68$, $p(-2\sigma < x < 2\sigma) = 0.95$, and $p(-3\sigma < x < 3\sigma) = 0.997$.

2 Normal Distribution, PDFs

1. The patient recovery time from a particular surgical procedure is normally distributed with a mean of 5.3 days and a standard deviation of 2.1 days. Which of the following is the median recovery time?
 - A: 5.3 days
 - B: 2.9 days
 - C: 2.1 days
 - D: 1.0 days
2. What is the z-score for a patient who takes 11.6 days to recover?
 - A: 2.0
 - B: 3.0
 - C: 3.5
 - D: 4.5
3. The systolic blood pressure (given in millimeters) of males has an approximately normal distribution with mean $\mu = 125$ and standard deviation $\sigma = 14$. Systolic blood pressure for males follows a normal distribution. (a) What blood pressure corresponds to a result that is 2σ above the mean? (b) What is the probability that someone has a blood pressure of 153 millimeters? (c) Draw the blood pressure distribution below.
4. A certain radar system can hear a radio-frequency reflection with a minimum *signal-to-noise ratio* (SNR) of 3.0. The signal is hidden in random radio noise, that has units of voltage. The amplitude of the noise voltages are approximately normally distributed, with $\mu = 0$ Volts, and $\sigma = 0.03$ Volts. In this case, the SNR is essentially the voltage of the signal divided by σ . What is the minimum signal echo voltage the radar needs to make a detection?