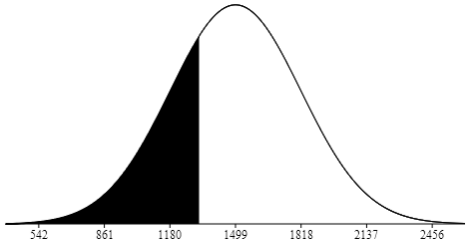
Answers to Extra Practice with Normal Distributions

Extra Practice I:

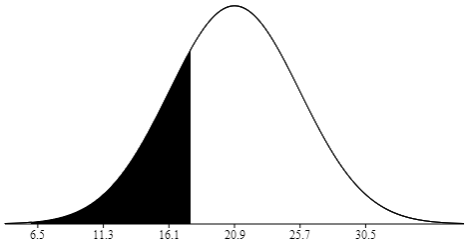
1. On the SAT, Jose's z-score is $z = \dfrac{1770 - 1499}{319} = 0.85$. To find his equivalent score on the ACT, we solve $0.85 = \dfrac{x - 20.9}{4.8}$ for x and get $x = 24.98$.

2. Step 1: State the distribution and values of interest. For the SAT, scores follow a Normal distribution with mean 1499 and standard deviation 319. We want to find the percent of students with scores less than 1320 (see graph below). **Step 2: Perform calculations. Show your work.** The standardized score for the boundary value is $z = \dfrac{1320 - 1499}{319} = -0.56$. From Table A, the proportion of z-scores below –0.56 is 0.2877. *Using technology:* The command normalcdf(lower: –1000, upper: 1320, μ: 1499, σ: 319) gives an area of 0.2874. **Step 3: Answer the question.** Tanya's score is at the 29th percentile.

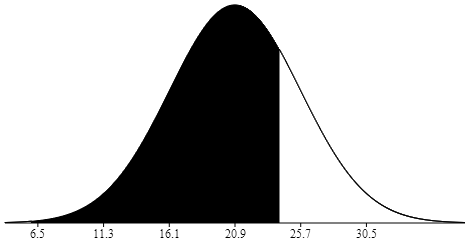


SAT scores

3. Step 1: State the distribution and values of interest. For the ACT, scores follow a Normal distribution with mean 20.9 and standard deviation 4.8. The 25^{h} percentile is the boundary value x with 25% of the distribution to its left (see graph below). Likewise, the 75^{h} percentile is the boundary value x with 75% of the distribution to its left (see graph below). **Step 2: Perform calculations. Show your work.** Look in the body of Table A for a value closest to 0.25. A z-score of –0.67 gives the closest value (0.2514). Solving $-0.67 = \dfrac{x - 20.9}{4.8}$ gives $x = 17.7$. *Using technology:* The command invNorm(area: 0.25, μ: 20.9, σ: 4.8) gives a value of 17.7. Likewise, solving $0.67 = \dfrac{x - 20.9}{4.8}$ gives $x = 24.1$. **Step 3: Answer the question.** For the ACT, the quartiles are 17.7 and 24.1.



ACT scores



ACT scores