2.2
a)The uniform distribution forms a rectangle of base = 1 and height = 1. The area of this rectangle is 1, as the area under any density function should be.
b) $P(x \geq 0.8) = 0.2$
c) $P(x \leq 0.6) = 0.6$
d) $P(0.25 \leq x \leq 0.75) = 0.5$
e)The mean, $\mu = 0.5$

2.3
a)We note that the function is >0 for all x values, and that the Area under the function is $1(0.8) + \frac{1}{2}(0.4)(1) = 1$.
b) $P(0.6 \leq X \leq 0.8) = (1)(0.2) = 0.2$
c) $P(0 \leq X \leq 0.4) = \frac{1}{2}(1 + 2)(0.4) = 0.6$
d) $P(0 \leq X \leq 0.2) = \frac{1}{2}(2 + 1.5)(0.2) = 0.35$

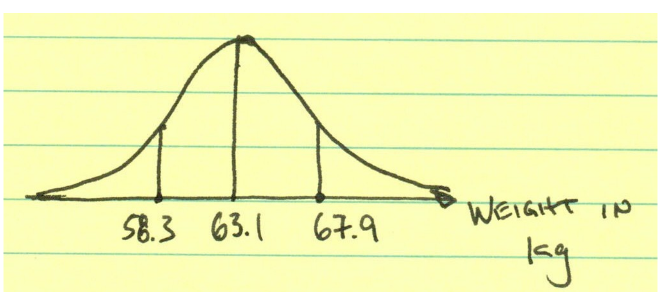
e)The median is such that $P(0 \leq X \leq Median) = 0.5$. Since $0.2 \leq 0.5 \leq 0.6$, we know that *Median* must be between 0.2 and 0.4 from our previous calculations.

2.4
a)The Median is at point B and the Mean is at point C.
b)The Median and the Mean are both at point A.
c)The Median is at point B and the Mean is at point A.

2.11 The two standard deviations are approximately 0.2 and 0.5

2.14
a)The 16th percentile is one standard deviation below the mean, so the score is 110 – 25 = 85.
b)The 84th percentile is one standard deviations above the mean, so the score is 110 + 25 = 135.
c)The 97.5th percentile is two standard deviations above the mean, so the score is 110 + 2(25) = 160.

2.15 Here is a sketch of the graph…



68% of the weights will be between 58.3 kg and 67.9 kg.
95% of the weights will be between 53.5 kg and 72.7 kg.
99.7% of the weights will be between 48.7 kg and 77.5 kg.

2.20

Ty Cobb's z-score = $\dfrac{0.42 - 0.266}{0.0371} = 4.151$

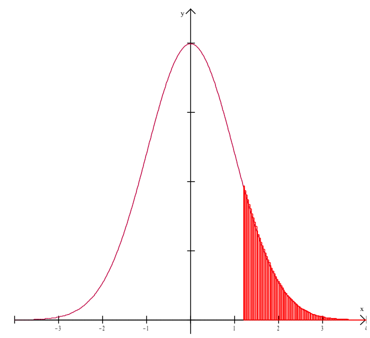
Ted Williams' z-score = $\dfrac{0.406 - 0.267}{0.0326} = 4.26$

George Brett's z-score = $\dfrac{0.39 - 0.261}{0.0317} = 4.07$

Relative to his peers, Ted Williams had the best batting average of the three.

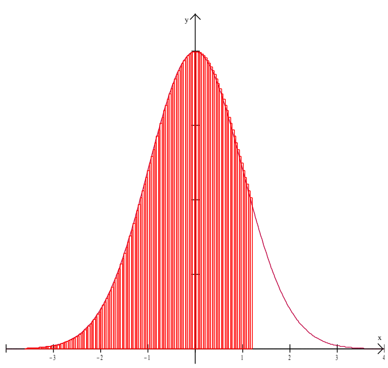
2.23

Let X represent the height of an adult American man. Then $X \sim N(69, 2.5)$.



(a) $P(X \geq 72) = P\left(z \geq \dfrac{72 - 69}{2.5}\right) = 1 - P\left(z \leq \dfrac{72 - 69}{2.5}\right) \approx 1 - 0.8849 = 0.115$

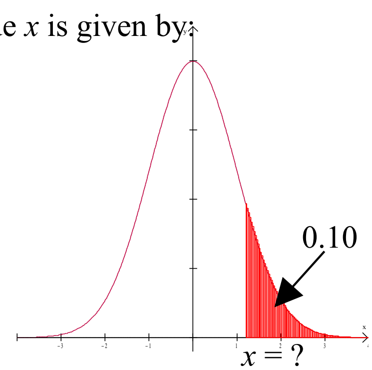
(b) $P(60 \leq X \leq 72) = P(X \leq 72) - P(X \leq 60) = P\left(z \leq \dfrac{72 - 69}{2.5}\right) - P\left(z \leq \dfrac{60 - 69}{2.5}\right) \approx 0.8849 - 0 = 0.8849$



(c) From the figure to the left, we know the z-score corresponding to the value x is given by:

$z = \dfrac{x - 69}{2.5}$, so

$x = 2.5z + 69.$



Now the z-score corresponding to 10% area to the right is about 1.285, so

$x = 2.5(1.285) + 69 = 72.2125$

That means to be in the tallest 10% of adult American men, a guy must be at least 72.2125 inches tall.

2.33

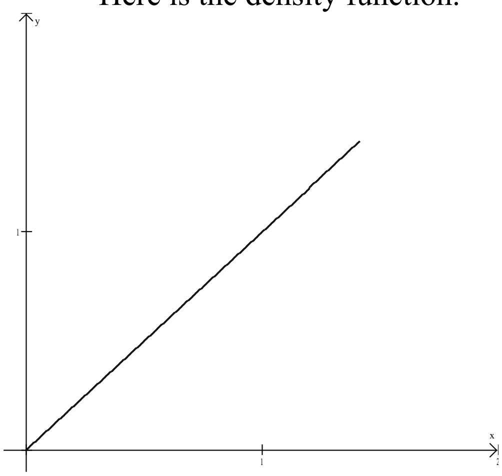
(a) $Q_1 = invnorm(0.25) = -0.674$
$Q_2 = 0$
$Q_3 = invnorm(0.75) = 0.6748$

(b) The quartiles $Q_{1,}$ $Q_{2,}$ and Q_3 lie, respectively, -.674, 0, and .674 standard deviations from the mean. So the quartiles for the lengths of human pregnancies, *X*, are

$x_1 = -.674(16) + 266 = 255.2 \text{ days},$
$x_2 = 266 \text{ days},$
$x_3 = 266 + .674(16) = 276.7968 \text{ days}$

2.38

Here is the density function.



We need the area under this density function to equal 1. Since the region under the curve is a right triangle, we need $\frac{1}{2}x^2 = 1$ so that *x* is the *x*-coordinate of the right endpoint. Then $x = \sqrt{2}$.

The median is the *x* value such that $\frac{1}{2}x^2 = \frac{1}{2}$, so *x* = 1 = Median.

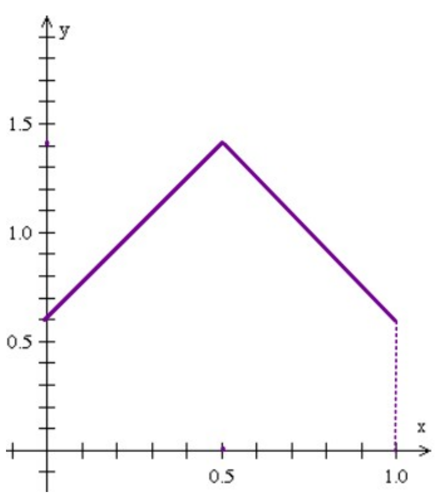
The 1st quartile is the *x* value such that $\frac{1}{2}x^2 = \frac{1}{4}$, so $Q_1 = \frac{\sqrt{2}}{2}$.

The 3rd quartile is the *x* value such that $\frac{1}{2}x^2 = \frac{3}{4}$, so $Q_1 = \frac{\sqrt{6}}{2}$.

Since the distribution is clearly skewed to the left, we would expect the mean to be less than the median.

$P(X \le 0.5) = \frac{1}{2}(0.5)(0.5) = 0.125$, and since the endpoint of the distribution is less than 1.5, $P(X > 1.5) = 0$.

2.39



(a) Area = (0.6)(1) + (0.5)(1)(0.8) = 1

(b) Med = 0.5 (by symmetry), and $Q_1 \approx 0.3$, $Q_3 \approx 0.7$

(c) Since the equation of the line is $y = \frac{8}{5}x + 0.6$, *y* = 1.08 when *x* = 0.3, $P(X < 0.3) = \frac{1}{2}(1.08 + 0.6)(0.3) = 0.252$

(d) By symmetry $P(X > 0.7) = 0.252$, so

$P(0.3 < X < 0.7) = 1 - 2(0.252) = 0.496$

2.40

These numbers simply mean that Joey scored better than 97 percent of all of the other folks who took the reading test and better than 72 percent of all of the folks who took the math test. So, for example, if there were 100 people who took the reading test, and they all lined up according to their score from the least score to the greatest, Joey would be the 97^{th} person in line… only 3 people away from the highest score.

2.44

Let X represent the scores on the Chapin Social Insight Test. $X \sim N(25,5)$.

a) $P(X \leq 20) =$ normcdf(-1E99, 20, 25, 5) = 0.159

b) $P(X \leq 10) =$ normcdf(-1E99, 10, 25, 5) = 0.0013

c) $P(X \geq 35) =$ normcdf(35, 1E99, 25, 5) = 0.023

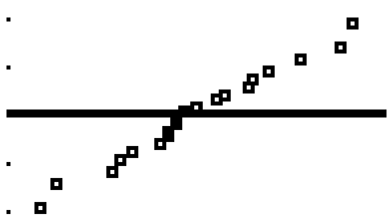
d)To be in the top 25% of the population, we need x such that $P(X \leq x) = 0.75$.

So x = invNorm(.75, 25, 5) = 28.37

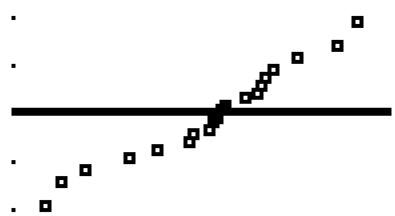
2.50

The NP plots are shown below.

Normal Corn NPP



New Corn NPP



Since both plots appear fairly linear, we can assume the data are approximately normally distributed. Therefore it is appropriate to use $\bar{x}$ and s as measures of center and variablility.