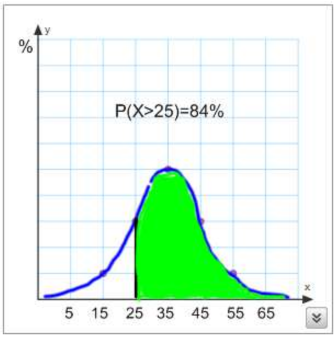
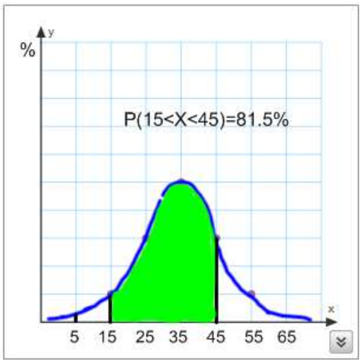
1. $X \sim N(35, 10^2)$

a)



b)



2. a)

$$\begin{aligned} P(X > 115) &= 1 - P(X < 115) \\ &= 1 - P\left(Z < \frac{115-119}{3}\right) \\ &= 1 - P(Z < -1.33) \\ &= 1 - 0.0918 \\ &= 90.82\% \end{aligned}$$

b)

$$\begin{aligned} P(X < 29) &= P\left(Z < \frac{29-30}{2}\right) \\ &= P(Z < -0.5) \\ &= 30.85\% \end{aligned}$$

c)

$$\begin{aligned} P(64 < X < 82) &= P(X < 82) - P(X < 64) \\ &= P\left(Z < \frac{82-66}{4}\right) - P\left(Z < \frac{64-66}{4}\right) \\ &= P(Z < 4) - P(Z < -0.5) \\ &= 1 - 0.3085 \\ &= 69.15\% \end{aligned}$$

3. a) Since $P(Z < -0.67) \approx 0.25$, then the Z-score is -0.67.

b)

$$\begin{aligned} P(Z < 1.79) &= 0.9633 \\ &= 96.33\% \end{aligned}$$

Therefore, the 96th percentile corresponds to 1.79.

4. $P_{78} : 0.78 \times 15478 \approx 12072.84$ students below.

So, 15478-12073=3405. Therefore, 3405 students had a score higher than Dave's score.

5. a) $X \sim N(400, 2500)$

$X \sim N(400, 50^2)$

$P(X = 300) = P\left(Z = \frac{300-400}{50}\right)$
$= P(Z = -2)$
$= 2.28\%$

Since 50% of 600 is 300, then

Therefore, a student who just passed is in the 3rd percentile interval.

b) Variance=2500 marks.

6. $X_{Jason} \sim N(11.1, 2.1^2)$
$X = 8.4$

$X_{Kendra} \sim N(10.7, 1.5^2)$
$X = 9.0$

$P_{Jason}(X = 8.4) = P\left(Z = \frac{8.4-11.1}{2.1}\right)$
$= P(Z = -1.29)$
$= 9.85\%$

$P_{Kendra}(X = 9.0) = P\left(Z = \frac{9.0-10.7}{1.5}\right)$
$= P(Z = -1.13)$
$= 12.92\%$

Since Jason's probability (or Z-Score) is less than Kendra's probability (Z-Score), then Jason had a more disappointing quiz mark. (Finding and comparing the Z-Scores would be sufficient for this problem)

7. $X \sim N(1.125, 0.005^2)$

$$
\begin{aligned}
P_{outsi\,\det herange} &= 1 - P(1.117 < X < 1.133) \\
&= 1 - P(X < 1.133) - P(X < 1.117) \\
&= 1 - \left[P\left(Z < \frac{1.133-1.125}{0.005}\right) - P\left(Z < \frac{1.117-1.125}{0.005}\right)\right] \\
&= 1 - P(Z < 1.6) + P(Z < -1.6) \\
&= 1 - 0.9452 + 0.0548 \\
&= 10.96\%
\end{aligned}
$$

Since 10.96% of 1000000 is 109600, then 109600 chips will fall outside of the interval.

8. $X \sim N(500, 20^2)$

$$
\begin{aligned}
P(X > 509) &= 1 - P(X < 509) \\
&= 1 - P\left(Z < \frac{509-500}{20}\right) \\
&= 1 - P(Z < 0.45) \\
&= 1 - 67.36 \\
&= 32.64\%
\end{aligned}
$$

Therefore, there is a 32.64% chance that a 500 mL jar will contain more than 509 mL of maple syrup.

9.

$$P(X > 60) = 0.7$$
$$P(X > 60) = 1 - P(X < 60)$$
$$P(X < 60) = 0.3$$
$$P\left(Z < \frac{60 - \bar{x}}{\sigma}\right) = 0.3$$
$$\frac{60 - \bar{x}}{\sigma} = -0.52$$
$$-0.52\sigma = 60 - \bar{x}$$

$$P(X > 90) = 0.10$$
$$P(X > 90) = 1 - P(X < 90)$$
$$P(X < 90) = 0.9$$
$$P\left(Z < \frac{90 - \bar{x}}{\sigma}\right) = 0.9$$
$$\frac{90 - \bar{x}}{\sigma} = 1.28$$
$$1.28\sigma = 90 - \bar{x}$$

Solve the following linear system either by elimination or substitution to fine the mean and the S.D.

$$\begin{cases} -0.52\sigma = 60 - \bar{x} \\ 1.28\sigma = 90 - \bar{x} \end{cases}$$
$$-1.80\sigma = -30$$

Therefore, $\sigma \approx 16.67\%$ and $\bar{x} \approx 68.67\%$.

10. a) $\sum_{i=1}^{5}(2i-5) = -3 - 1 + 1 + 3 + 5$

b) $\frac{7}{1} + \frac{7}{2} + \frac{7}{3} + \frac{7}{4} + \frac{7}{5} + \frac{7}{6} + \frac{7}{7} = \sum_{i=1}^{7}\frac{7}{i}$