Question 1

(a) For a triangle, the area = $\frac{1}{2} \times b \times h$.

Here, b=2, h=1, so the area of this triangle = $\frac{1}{2} \times 2 \times 1 = 1$.

(b) {Y < 1} is the left half of the triangle, so the probability is ½=0.5.

(c) {Y < 0.5} is a triangle with b=0.5. By similar triangles, the height is also 0.5. The probability = $\frac{1}{2} \times 0.5 \times 0.5 = \frac{1}{8}$.

Question 2

(a)

$$\mu_X = 540 \times 0.1 + 545 \times 0.25 + 550 \times 0.3 + 555 \times 0.25 + 560 \times 0.1 = 550$$

$$\sigma_X^2 = (540 - 550)^2 \times 0.1 + (545 - 550)^2 \times 0.25 + (550 - 550)^2 \times 0.3 + (555 - 550)^2 \times 0.25 + (560 - 550)^2 \times 0.1 = 32.5$$

$$\sigma_X = \sqrt{32.5} = 5.701$$

(b)

$$\mu_{X-550} = \mu_X - 550 = 550 - 550 = 0$$

$$\sigma_{X-550} = \sigma_X = 5.701$$

So the mean of X-550 is 0^oC, and the standard deviation of X-550 is 5.701^oC.

(c)

$$\mu_Y = \mu_{\frac{9}{5}X+32} = \frac{9}{5}\mu_X + 32 = \frac{9}{5} \times 550 + 32 = 1022^0 F$$

$$\sigma_Y = \sigma_{\frac{9}{5}X+32} = \frac{9}{5}\sigma_X = \frac{9}{5} \times 5.701 = 10.26^0 F$$

Question 3

(a) P (a randomly chosen person is a woman) = 922/1654 = 0.55744.

(b) P (the chosen person is a woman | choose a person with professional degree) = 32/72=0.4444.

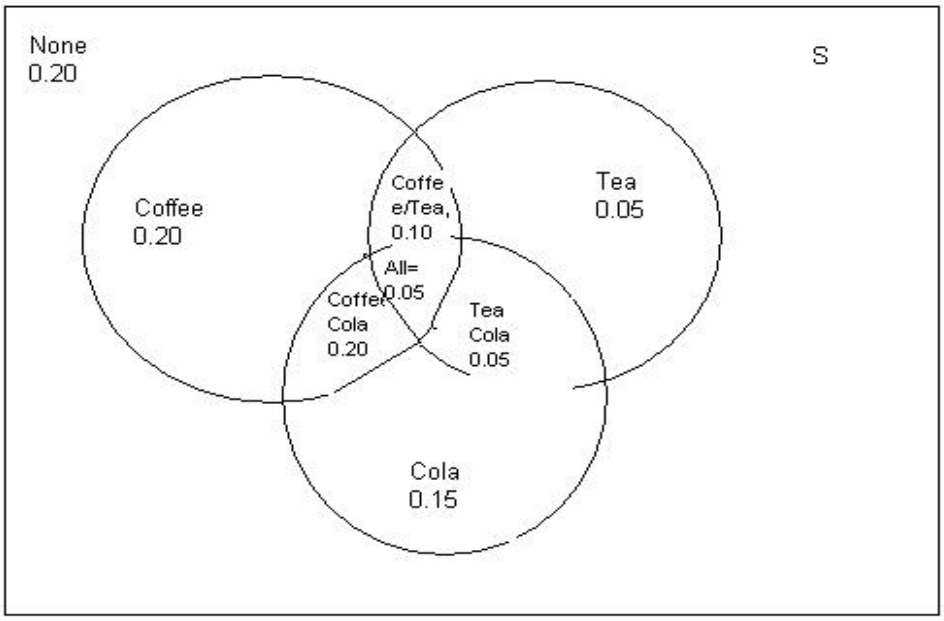
(c) The events "choose a woman" and "choose a professional degree recipient" are not independent because P(woman | professional) ≠ P(woman).

Question 4

From the below Venn diagram, we could get:

P(cola only) = 0.15

P(none of these) = 1-(0.20+0.20+0.10+0.05+0.15+0.05+0.05) = 0.2



Question 5

Using the below tree-diagram, we could get:

P(For) = $0.4 \times 0.3 + 0.4 \times 0.9 + 0.2 \times 0.5 = 0.58$.

P(Black | For) = 0.36/0.58 = 0.6207.