Part 2.

1.) It is a Binomial Distribution.

i) The are two possible outcomes in this experiment That is One hide purchases and the other a failure

ii) The experiment can be repeated many times that is the married couple can be experimented many time,

iii) The probability of success in one trial can be independent to any other trial that is. When the first couple is experimented the trial of the other couple will not depend on the first.

iv) The probability of the experiment remains constant from one trial to another that is if the probability of the first experiment of the married couple will not change throughout the experiment.

2) Π - The sample size of the population = 20

3) P - The probability of success that is 80% which is equal to 0.8

7) P (Between 10 and 15 hide Purchases)

$P(x=10) + P(x=11) + P(x=12) + P(x=13) + P(x=14) + P(x=15)$

$20C_{10}(0.8)^{10}(0.2)^{10} + 20C_{11}(0.8)^{11}(0.2)^{9} + 20C_{12}(0.8)^{12}(0.2)^{8} + 20C_{13}(0.8)^{13}(0.2)^{7} + 20C_{14}(0.8)^{14}(0.2)^{7} + 20C_{15}(0.8)^{15}(0.2)^{5}$

$= 0.3756$

8) P(Less than 10 or more than 15 hide purchases)

$P(\text{less than } 10) = P(x < 10)$

$= 0.9493$

$P(\text{less than more than } 15) = P(x \geq 19)$

$P(x=15) + P(x=16) + P(x=17) + P(x=18) + P(x=19) + P(x=20)$

$20C_{15}(0.8)^{15}(0.2)^{5} + 20C_{16}(0.8)^{16}(0.2)^{4} + 20C_{17}(0.8)^{17}(0.2)^{3}$

$0.1745 + 0.2182 + 0.2053 = 0.5980$

$20C_{18}(0.8)^{18}(0.2)^{2} + 20C_{19}(0.8)^{19}(0.2)^{1} + 20C_{20}(0.8)^{20}(0.2)^{0}$

$0.5980 + 0.1361 + 0.0576 + 0.0115$

$= 0.8032$

$0.9493 - 0.8032 = 0.1461$

Part 3 No.2

Mean = 460

standard deviation = 60

$P(X \geq x) = 10\%$

$P(X \geq x) = 0.10$

$Z : P(z > z) = 0.10$

i.e. Find z:

$P(z < z) = 1 - P(z < z)$

$P(z < z) = 1 - 0.10$

$P(z < z) = 0.90$

Z For 0.9000 = 1.28

$x = \mu + z\sigma$

$x = 460 + 1.28(60)$

$x = 460 + 76.8$

$x = 536.8$ Required amount required for the boys to earn a certificate of recognition from the fitness association is ~~56~~ 536.8

Part 3 No. 1

1.) a) $P(X < 12) = P(Z < (12 - 12.3) / 0.20 = P(Z < -1.5)$

$= 0.0668$

b) Between 11.8 and 12.2

$P(11.8 < X < 12.2) = P(11.8 - 12.0) / 0.20 <$

$((12.3 - 12) / 0.20$

$=$

$P(-0.2 / 0.20 < Z < 0.3 / 0.20)$

$P(-1 < Z < 1.5) = 1.5866 - 0.93319$

$= 0.65341$

c) $P(X > 12.21) = P(Z < (12 - 12.21) / 0.04$

4) P(Exactly 15 hide purchases)

$$P(x) = {}^{n}C_{x}\,\pi^{x}(1-\pi)^{n-x}$$

$P(x=15)$

$p = 0.8 \quad q = 0.2 \quad n = 20$

$$20C_{15}\,(0.8)^{15}(0.2)^{20-15} = 0.1745$$

5) P(atleast 19 hide purchases

$$P(x \geq 19) = P(x=19) + P(x=20)$$

$$20C_{19}\,(0.8)^{19}(0.2)^{20-19} + 20C_{20}\,(0.8)^{20}(0.2)^{20-20}$$

$$= 0.0576 + 0.0115$$

$$= 0.0691$$

6) P(Fewer than 10 hide purchases)

$$P(x<10) = 1 - P(x \geq 10)$$

$$= 1 - 20C_{10}(0.8)^{10}(0.2)^{10} + 20C_{11}(0.8)^{11}(0.2)^{9} + 20C_{12}(0.8)^{12}(0.2)^{8}$$

$$+ 20C_{13}\,0.8^{13}(0.2)^{7} + 20C_{14}\,0.2^{6}(0.8)^{14}$$

$$+ 20C_{15}\,(0.8)^{15}(0.2)^{5} + 20C_{16}\,(0.8)^{16}(0.2)^{4}$$

$$+ 20C_{17}\,(0.8)^{17}(0.2)^{3} + 20C_{18}\,(0.8)^{18}(0.2)^{2}$$

$$+ 20C_{19}\,(0.8)^{19}(0.2)^{1} + 20C_{20}\,(0.8)^{20}(0.2)^{0}$$

$$= [0.000203] + [7.386 \times 10^{-3}] + 0.0277 + 0.0545$$

$$+ 0.109 + 0.175 + 0.218 + 0.205 + 0.1369$$

$$0.0576 + 0.0115 = 0.7493$$

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$x = 536.8$

Required amount required for the boys to earn a certificate of recognition from the fitness association is 536.8

9) $P = 0.8$

$n = 52$ married people

Expected value = np.

$= 0.8 \times 52$

$= \underline{\underline{42}}$ people

4) P (Exactly 15 hide purchases)

$$P(x) = {}^{n}C_{x}\,\pi^{x}(1-\pi)^{n-x}$$

$P(x=15)$

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