1. Section 1

Starting Equations:

$$class1 : A = [2, 2]^T, B = [3, 5]^T$$
$$class1\_bias : A = [1, 2, 2]^T, B = [1, 3, 5]^T$$
$$class2 : C = [1, 3]^T, D = [-1, -0.5]^T$$
$$class2\_bias : C = [1, 1, 3]^T, D = [1, -1, -0.5]^T$$
$$initial_w eight_v ector : W0 = [1, 1, 1]^T$$

First Step of weight vector updating:

$$W0 * A = 5(OK)$$
$$W0 * B = 9(OK)$$
$$W0 * C = 5(NOTOK)$$
$$W1 = W0 - C = [0, 0, -2]$$
$$W1 * D = 1(NOTOK)$$
$$W2 = W1 - D = [-1, 1, -1.5]$$

Second Step of weight vector updating:

$$W2 * A = -2(NOTOK)$$
$$W3 = W2 + A = [0, 3, 0.5]$$
$$W3 * B = 11.5(OK)$$
$$W3 * C = 4.5(NOTOK)$$
$$W4 = W3 - C = [-1, 2, -2.5]$$
$$W4 * D = -1.75(OK)$$

Third Step of weight vector updating:

$$W4 * A = -2(NOTOK)$$
$$W5 = W4 + A = [0, 4, -0.5]$$
$$W5 * B = 9.5(OK)$$
$$W5 * C = 2.5(NOTOK)$$
$$W6 = W5 - C = [-1, 3, -3.5]$$
$$W6 * D = -2.25(OK)$$

Four Step of weight vector updating:

$$W6 * A = -2(NOTOK)$$
$$W7 = W6 + A = [0, 5, -1.5]$$
$$W7 * B = 7.5(OK)$$
$$W7 * C = 0.5(NOTOK)$$
$$W8 = W7 - C = [-1, 4, -4.5]$$
$$W8 * D = -2.75(OK)$$

Five Step of weight vector updating:

$$W8 * A = -2(NOTOK)$$
$$W9 = W8 + A = [0, 6, -2.5]$$
$$W9 * B = 5.5(OK)$$
$$W9 * C = -1.5(OK)$$
$$W9 * D = -4.75(OK)$$

Final result:

$$W9 * A = 7.000000$$
$$W9 * B = 5.500000$$
$$W9 * C = -1.500000$$
$$W9 * D = -4.750000$$
$$W9 = [0, 6, -2.5]$$

2. Section 2

By Hand:

```
probability <- .6
number_of_weak_learners <- 7
x <- ceiling(number_of_weak_learners/2)
final_sum <- 0

for(i in number_of_weak_learners:x) {
  binomial_coefficient <- (factorial(number_of_weak_learners) /
                                  (factorial(i) * factorial(number_of_weak_learners-i)))
  p <- probability^i
  np <- (1-probability)^(number_of_weak_learners-i)
  final_sum <- final_sum + (binomial_coefficient * p * np)
}
print(final_sum)
```

R Packages:
```
final_sum <- dbinom(7, size=7, prob=0.6) +
             dbinom(6, size=7, prob=0.6) +
             dbinom(5, size=7, prob=0.6) +
             dbinom(4, size=7, prob=0.6)
```

ANSWER: 71.0208% majority vote accuracy

3. Section 3

4. Section 4

5. Section 5