**Confusion Matrix:**

* **A:** Denotes that I predicted an event (e.g., an attack) given that it is actually happening
* **D:** Predicting a non-event (normal conditions) given that we are under normal operating conditions
* **B:** Predicted an attack; however, in reality there was not one (false alarm/positive)
* **C:** Predicted a non-event; however, there was an attack (mis-alarm/ false negative)

**Issues with Some of the Binary Classification Metrics:**

* Let’s say that we have a model that is 99% accurate. **What does this tell me?**
  + Accuracy = (A+D)/(total obs)
  + Accuracy = (A+D)/(A+B+C+D) = 99%. **Is this any good?**
  + The true answer is it depends:
    - For the most part in 491 (at the least in the beginning), this will be a great model under two assumptions:
      * Attacks and non-attacks are equally likely (balanced dataset;
        + 0s and 1s are about equal in my data)
        + If this is not true, 99% can be terrible; For example,

Attacks -> 10

Non-events 🡪 990

Model will predict “non-events” for all 1,000 obs

* Sensitivity is the probability of detecting an event given that an event is actually occurring
* Specificity is the probability of detecting a non-event (normal conditions) given that no event is happening
* Gmean in lieu of balanced accuracy 🡪 gmean = sqrt(sens\*spec)
* Precision is A/A+B; out of my predicted positive cases how many are actually positive