Homework 1, ECE 590 & CS320 Software Reliability

1. Please use your own words to describe the different definitions of **fault**, **error** and **failure**.

fault : when the service can not be finished and delivered to the client
error : when can when system come to a state that has wrong data and could lead to wrong service to the client
fault : the construct of the code itself which could lead to fault eventually.

2. Take any program that you have written (paste the piece of codes) and identify at least one fault (bug), the errors it will cause, the inputs that will trigger the fault and failure that results. How can you avoid them next time?

```
while(cur != NULL || !st.empty()) {
    if(cur!=NULL) {
        st.push(cur);
        cur = cur->left;
    } else {
        cur = st.top();
        st.pop();
        record.push_back(cur->val);
        cur = cur->right;
    }
}
```

the error is that when I first write this code, I left out the “cur != NULL” statement. And the execute arrow cannot go into the while loop at the first time. And then the return value is wrong and user cannot get the desired answer.
next time I can first be more careful with the judging condition in the while loop and then go through some testcases by hand before executing the code.

3. Find a well-publicized incident, read about it and determine, the fault(s), errors and failure of this accident. And find out how the engineers react after the incident happens?

“On Tuesday, 16 November 2021 at 09:35 PT, Google Cloud Networking experienced issues with the Google External Proxy Load Balancing (GCLB) service. Affected customers received Google 404 errors in response to HTTP/S requests. ” Google engineers noticed the issue through automated alerting, which aligned with incoming customer support requests. The engineers immediately started to solve the issue by rolling back to the last known good configuration and 404 errors are resolved. To avoid the risk of a recurrence, the engineers suspended customer-initiated configuration and fix the problem, then deployed additional proctoring and monitoring to ensure safe resumption of service.

4. Try to describe the classification of errors.

if sort software errors by nature:
1. functional Errors, the function can not work properly
2. performace Issues, the function can not work efficiently
3. compatibility errors, the function can not work well with other third party apps