Problem 4

Part A

Outliers can be bad for boosting because boosting builds each tree on previous trees' residuals/errors. Outliers will have much larger residuals than non-outliers, so gradient boosting will focus a disproportionate amount of its attention on those points.

Part B

Based on [1], AdaBoost does not necessarily converge to a maximum margin solution. They have also proved the conjecture that AdaBoost is not robust to the choice of weak classifier .In addition, AdaBoost sensitivity to noise is a major problem that can lead to non-convergent algorithms, regardless of how poor learners combine and weak learner type.

[1] Cynthia Rudin, Ingrid Daubechies, Robert E. Schapire, The Dynamics of AdaBoost: Cyclic Behavior and Convergence of Margins," Journal of Machine Learning Research 5 (2004) 1557–1595.