Paid Search Bid Optimization Exercise

Part A

	kw8322228	**kw8322392**	**kw8322393**	**kw8322445**
alpha	74.09140	156.4398	104.79935	188.1117
beta	0.03945	0.1501	0.07972	0.4323

Part B1

	kw8322228	**kw8322392**	**kw8322393**	**kw8322445**
optimal bid value	34.12732	13.56266	22.43343	5.816892
corresponding profit	3950.532	6033.113	5451.701	4544.218
corresponding total expenditure	1870.626	1844.679	1957.853	1005.712

Part B2

LTV is inversely related to alpha, as LTV goes larger, alpha becomes smaller

LTV is inversely related to beta, as LTV goes larger, beta becomes smaller

LTV is positively related to optimal bid, as LTV goes larger, optimal bid becomes higher

Reasons:

Keyword with larger LTV generally targets a smaller customer segment, so the maximum number of clicks of this segment is smaller, which means alpha is smaller.

With larger LTV, there will be more intensive competition among companies in terms of customer acquisition. Since beta is inversely related to competition intensity, so the larger the LTV, the lower the beta will be.

With larger LTV, customers are more profitable to a company. So there will be more competitors compete for higher LTV customer segments. Therefore, keyword targets higher LTV customer segments will also have fiercer competition, so the optimal bid amounts for the keywords will be higher.

Part C

	kw8322228	**kw8322392**	**kw8322393**	**kw8322445**
optimal bid value	17.924259	8.118448	12.828280	3.775706
corresponding profit	3315.588	5487.552	4836.734	4286.526
corresponding total expenditure	673.2252	894.5586	860.9061	571.4057
Expenditure reduction (%)	64.01070	51.50600	56.02805	43.18396

kw8322445 has the least percentage reduction in expenditure, as a result of the constraint. Keyword targeting at lower LTV customer segment is less affected by the budget constraint, because its profit reaches the peak very fast (steepest tangent line), which means if we reduce the same amount of dollars for the optimal bid, the profit drops fastest. Therefore, with the objective to maximize profit while meeting the budget constraint, the decrease in bid amount of keyword kw8322445 is the least.