Price Indexes:
Measure relative changes in prices over time. Index numbers are essentially a ratio of the price of goods today compared to their price in previous years.

Symbols Used in Calculating Price Change between Two Periods, and Index Numbers to Estimate Current Prices:
- NI: New Index for the time we are calculating an estimate.
- OI: Old Index from the time of the historical data element.
- NP: New Price what we are trying to calculate an estimate for.
- OP: Old Price the historical price paid.

Formula for Calculation of Percentage Change:
\[
\frac{\text{NI}}{\text{OI}} \times 100 - 100 = \text{Percentage Change}
\]
NI = New Index, OI = Old Index

Formula for Calculation of Future Price:
\[
\frac{\text{NI}}{\text{OI}} \times \text{OP} = \text{NP}
\]
NI = New Index, OI = Old Index, OP = Old Price, NP = New Price

Given: OP = $5,000, OI in 2009 = 105.0, NI in 2014 = 122.
Calculate the estimated price in 2014:
\[
\frac{122}{105} \times 5000 = 5809.52
\]

Mean:
Calculated by adding all numbers and dividing by the total number of values.
i.e., in \{1,2,3,4,5\} = 1+2+3+4+5=15 ... 15/5 = 3, 3 is the mean of the set \{1,2,3,4,5\}

Median:
Is the middle value of the numbers listed in ranking order.
i.e., in \{1,4,3,2,5\} 1,2,3,4,5 ... 3 is the median for this set

Mode:
Is the most frequent value of the set.
i.e., in \{1,2,3,4,4\} ... 4 is the mode

Range:
The difference between the largest and smallest values (i.e., maximum minus the minimum).
Best Efforts:
Parties estimate the cost to be no more than stated in the price schedule. Contractor agrees to use "best efforts" to perform within the estimated cost. Contractor is to notify the Government when it reaches 75% of the total estimated cost. Contractor is not obligated to perform beyond total estimated cost of the term contract; however on a completion contract, if the Government adds funding, the contractor is obligated to continue performance. Government is not obligated to add funding to continue the effort.

Profit or Fee:
Contractor retains all revenue without regard to the actual cost of performance upon acceptance of product. Contractor earns a profit or realizes a loss, or Contractor is paid a fixed or variable fee based on ability to control costs and/or perform well based on work percentage completed.

Commodity Groups:
Industry sectors are broken down into industry/commodity groups, which are aggregations of similar products (e.g., motor vehicles, footwear). In some cases, industry/commodity groups are further broken down into subgroups to create more meaningful data sets.

How many major commodity groups are there?
The best known and most frequently used source of price index numbers for material pricing is the Producer Price Indexes (PPI) published monthly by the BLS. These indexes report monthly price changes at the producer/wholesale level for 15 major commodity groups, and over 30 services.

Producer Price Index (PPI):
A producer price index for an industry is a measure of changes in prices received for the industry’s output sold outside the industry (that is, its net output). Producer price indexes measure the average change in prices received by domestic producers of commodities in all stages of processing. http://bls.gov/web/ppi/ppitable06.pdf

Consumer Price Index:
A measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services. Published by the Bureau of Labor and Statistics - www.bls.gov

Normal Shape of a Data Set:
When the data is balanced around the middle, having the same mean and median.
Skewed Shape of a Data Set:
   Data might have a "tail" to the right or left. A small number of extremely positive or negative values caused the mean to be either higher or lower that the median. When graphed, this produces a tail of data to the right or left.

Bi-modal or Multi-modal:
   More than one cluster of occurrences of data values along the continuum that, when graphed, appears as multiple peaks of data.

Economic Price Adjustment (EPA):
   Adjustment in contract price or cost for inflation, deflation, and other market factors.

Time Value of Money:
   Calculates the effects of interest (both earning and borrowing) inflation and deflation over time.

Time Value of Money Formula:
   \[ FV = PV \times (1+i)^t \]

Net Present Value (NPV):
   The difference between the present value of the receipts (cash inflows) and the present value of expenditures (cash outflows).

NPV Formula:
   \[ PV = FV \times \left( \frac{1}{1+i} \right)^t \]

"i" and "t" values for NPV:
   - i: interest rate
   - t: time period


Nominal Discounts Rates:
   The nominal interest rate reflects the real inflation rate plus a risk factor associated with normal lending.

Cost Estimating Relationship (CER):
   A parametric estimating method which is used to estimate prices of future purchases based upon comparison of prices or key parameters from historical prices.
Dependent Variables of CER:
Cost in dollars, labor hours, material cost, or some other measurement of cost,

Types of Cost:
Fixed (F), variable (Vu), and semi-variable (SVu).

Variable Cost:
Variable Cost (V) is a product of two elements: Variable Cost per Unit (Vu) and Quantity Produced (Q).

Fixed Costs:
Do not change as volume changes, assuming we remain within the relevant range of production. (Thus, a change in Total Cost is the result of a change in Variable Cost (which is Vu(Q)).

Total Cost (C):
When Fixed, Variable and Semi-Variable Costs are added together (i.e., C = F + Vu + SVu).

Cost Volume Analysis (CVA):
Used to analyze the natural relationship between cost and volume in pricing decisions.

Linear Relationship:
The CVA technique assumes use of a straight line relationship between cost and volume.

Situations for Using CVA:
1. Estimating item price in price analysis.
2. Evaluating direct costs in pricing new contracts.
3. Evaluating direct costs in pricing contract changes.
4. Evaluating indirect costs.
5. Estimating future costs/ prices during market research.

CVA Limitations:
- Age of the historical data.
- Changes in market conditions.
- Differences in order size, location, delivery terms, timelines.
- Different quality and/or warranty terms.
- New business strategies driving changes in supply.
- Straight "total cost line" or learning curve influence.

(Market research is the key to discovering and factoring these elements into any estimate.)
4 Steps to Develop a Cost Estimate with CVA:

1. Calculate the Variable Element.
2. Calculate the Fixed Element.
4. Calculate the estimated cost for the given quantity.