1. Operators : Add, subtract, multiply, divide,power
   1. ( Input : Val11, Val12 – output post operator in Val13)
   2. Pass Val11 and Val12 as inputs, not fixed
   3. **Will be provided**
2. ~~Logical comparison and operators - ? <,<=,>,>=,==,!=, || (OR), && (AND), ! (Negate) –~~
   1. ~~Input two VALs, say val11 and val12~~
   2. ~~Output ? confirm from Vivek ? (TBD)~~
3. Cond ? expr1:expr2 Ifelse.
   1. you want already fixed condition or flexibility there too ? **– fixed condition, all in pdf.**
4. Rank(x)
   1. Natural Rank – there in library
   2. Percentile Rank (between 0 and 1) –**Surbhi - standardize.**
5. StdDev(x,n) – there in query
6. Covariance(x,y,n) – there in query
7. Sum(x,n) – there in query
8. Correlation(x,y,n)
   1. **Will be made in query**
   2. **Will also provide functionality like time series.**
9. Abs(x)
   1. **Surbhi – standardize**
10. Delay(x,n)
    1. SQL provides this as functionality ( lead,lag)
11. Delta(x,n)
    1. SQL provides this as functionality ( lead,lag), do lead(x,n1)-lead(x,n2)
12. Decay\_exp(x,f,n)
    1. Decay\_linear : **Surbhi, standardize**
    2. <http://mathworld.wolfram.com/ExponentialDecay.html> - confirm from Vivek ? (TBD)
13. Ts\_min(x,n) - Minimum value of x over the last n days.
    1. There in query
    2. Ts\_max(x,n) – also there in query
14. Sign(x) :
    1. Returns 1 if x > 0, -1 if x < 0, 0 if x == 0 , **Will be provided**
15. SignedPower(x, e) :
    1. Sign(x) \* (Abs(x)^e) , **Will be provided**
16. Log(x) Natural logarithm ,
    1. **Will be provided**
17. Ts\_Rank(x, n) :
    1. Rank the values of x of the same instrument over the past n days, then return the rank of the current value. The rank value is between 0.0 ~ 1.0, as illustrated in the explanation of Rank(x).
    2. **Surbhi – standardize**
18. Ts\_Moment(x, k,n) :
    1. Compute the kth central moment of x on the last n days
    2. confirm from Vivek ? (TBD)
19. IndNeutralize(x, group) :
    1. Neutralize Alpha x against groupings specified by group. which can be any matrix, such as subindustry, industry, sector or a constant .
    2. **Surbhi – standardize – 1)grouping logic 2) neutralization logic**
20. Scale(x) , Scale Alpha x so that its Book size is 1, i.e., the sum of abs(x) over all instruments is 1. To scale to a different book size, say 1000, use Scale(x) \* 1000
    1. Same as normalize function, provided for weights**, will provide for generic use.**
21. GroupRank(group,x) - Returns the rank of each instrument within a group, which can be any matrix, such as subindustry, industry, sector or a constant.
    1. Same as 19th, **will provide**
22. GroupMean(x,group, weight) Returns the mean of each instrument's group, which can be any matrix, such as subindustry, industry, sector or a constant. The 'weight' argument can be used to calculate weighted mean. – - confirm from Vivek ? (TBD)
23. Ts\_Regression(y,x, window, lag,retval) – From the regression y[t] = a + b \* x[t‐lag] for t in (Today ‐ window, Today) returns one of (error\_term, a , b, estimate\_of\_y). The fifth parameter should be one of (0, 1, 2, 3) correspondingly.
    1. **Will be provided as time series functionality**
    2. Without lag, provided for cross-sectional as well. (**Surbhi – standardize, if needed)**
24. TradeWhen(x, y,z) (Non Time Series)
    1. TradeWhen(triggerTradeExp, alphaExp, triggerExitExp).
    2. If triggerExitExp > 0 , alpha = nan ; if triggerTradeExp >0 , alpha = alphaExp ; else, alpha = previousAlpha .
    3. confirm from Vivek ? (TBD)
25. ArgMax(x, n)
    1. Returns the relative index of the max value in the time series x for the past n days. If the current day has the max value for the past n days, it returns 0. If previous day has the max value for the past n days, it returns 1. If all values in the past n days are nan, it returns 0.
    2. **To be provided in query or as Time Series functionality, need to be decided first.**
26. ArgMin(x, n)
    1. Returns the relative index of the min value in the time series for the past n days. If the current day has the min value for the past n days, it returns 0. If previous day has the min value for the past n days, it returns 1. If all values in the past n days are nan, it returns 0.
    2. **To be provided in query or as Time Series functionality, need to be decided first.**