Homework 7

Problem 1

Code

```
% Vector 1000x1
v = randi(1000,1000,1);
% Number of Cores
nc = 2;
% Operation
op = 'sum';

parpool(nc);

tic();
result = mymapreduce(v,nc,op);
t = toc();
x1 = sprintf('Operation-%s on vector: Result: %d / Elapsed Time: %f',op,result,t);
disp(x1);

delete(gcp('nocreate'));

function result = mymapreduce(v,nc,op)
    result=zeros(1,nc);

    % Map Part
    spmd
        vector = v;
        c = codistributed(vector);
        l = getLocalPart(c);
        switch op
            case 'sum'
                s = sum(l);
            case 'max'
                s = max(l);
            case 'min'
                s = min(l);
            case 'average'
                s = mean(l);
        end
    end

    % Reduce Part
    k = gather(s);
    for i=1:nc
        result(i) = k{i};
    end
    switch op
        case 'sum'
            result = sum(result);
        case 'max'
            result = max(result);
        case 'min'
            result = min(result);
        case 'average'
            result = mean(result);
    end
end
```

Result

Number of Cores=2
Operation=sum

Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 2).
Operation-sum on vector: Result: 514919 / Elapsed Time: 0.507598
Parallel pool using the 'local' profile is shutting down.

Number of Cores=4
Operation=max

Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 4).
Operation-max on vector: Result: 999 / Elapsed Time: 0.752120
Parallel pool using the 'local' profile is shutting down.

Number of Cores=4
Operation=min

Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 4).
Operation-min on vector: Result: 2 / Elapsed Time: 0.777319
Parallel pool using the 'local' profile is shutting down.

Number of Cores=8
Operation=average

Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 4).
Operation-average on vector: Result: 5.030260e+02 / Elapsed Time: 0.760094
Parallel pool using the 'local' profile is shutting down.

Problem 2

Code

```
% Matrix 800x1000
v = randi(1000,800,1000);
% Number of Cores
nc = 2;
% Operation
op = 'sum';

parpool(nc);

tic();
result = mymapreduce(v,nc,op);
t = toc();
x1 = sprintf('Operation-%s on matrix: Result: %d / Elapsed Time: %f',op,result,t);
disp(x1);

delete(gcp('nocreate'));

function result = mymapreduce(v,nc,op)
    result=[];

    % Map Part
    spmd
        vector = v;
        c = codistributed(vector);
        l = getLocalPart(c);
        switch op
            case 'sum'
                s = sum(l);
            case 'max'
                s = max(l);
            case 'min'
                s = min(l);
            case 'average'
                s = mean(l);
        end
    end

    % Reduce Part
    k = gather(s);
    for i=1:nc
        result = [result k{i}];
    end
    switch op
        case 'sum'
            result = sum(result);
        case 'max'
            result = max(result);
        case 'min'
            result = min(result);
        case 'average'
            result = mean(result);
    end
end
```

Result

Number of Cores=2
Operation=sum

Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 2).
Operation-sum on matrix: Result: 400431904 / Elapsed Time: 0.608787
Parallel pool using the 'local' profile is shutting down.

Number of Cores=4
Operation=max

Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 4).
Operation-max on matrix: Result: 1000 / Elapsed Time: 0.824002
Parallel pool using the 'local' profile is shutting down.

Number of Cores=4
Operation=min

Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 4).
Operation-min on matrix: Result: 1 / Elapsed Time: 0.890260
Parallel pool using the 'local' profile is shutting down.

Number of Cores=8
Operation=average

Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 8).
Operation-average on matrix: Result: 5.007083e+02 / Elapsed Time: 1.582408
Parallel pool using the 'local' profile is shutting down.

Problem 3

Code

```
% Matrix 50x100x200
v = randi(1000,50,100,200);
% Number of Cores
nc = 2;
% Operation
op = 'sum';

parpool(nc);

tic();
result = mymapreduce(v,nc,op);
t = toc();
x1 = sprintf('Operation-%s on matrix: Result: %d / Elapsed Time: %f',op,result,t);
disp(x1);

delete(gcp('nocreate'));

function result = mymapreduce(v,nc,op)
    result=[];

    % Map Part
    spmd
        vector = v;
        c = codistributed(vector);
        l = getLocalPart(c);
        switch op
            case 'sum'
                s = sum(l);
            case 'max'
                s = max(l);
            case 'min'
                s = min(l);
            case 'average'
                s = mean(l);
        end
    end

    % Reduce Part
    k = gather(s);
    for i=1:nc
        result = [result k{i}];
    end
    switch op
        case 'sum'
            result = sum(result,'all');
        case 'max'
            result = max(result,[],'all');
        case 'min'
            result = min(result,[],'all');
        case 'average'
            result = mean(result,'all');
    end
end
```

Result

Number of Cores=2
Operation=sum

```
Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 2).
Operation-sum on matrix: Result: 500101541 / Elapsed Time: 0.535520
Parallel pool using the 'local' profile is shutting down.
```

Number of Cores=4
Operation=max

```
Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 4).
Operation-max on matrix: Result: 1000 / Elapsed Time: 0.693650
Parallel pool using the 'local' profile is shutting down.
```

Number of Cores=4
Operation=min

```
Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 4).
Operation-min on matrix: Result: 1 / Elapsed Time: 0.657407
Parallel pool using the 'local' profile is shutting down.
```

Number of Cores=8
Operation=average

```
Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 8).
Operation-average on matrix: Result: 5.009110e+02 / Elapsed Time: 1.304914
Parallel pool using the 'local' profile is shutting down.
```