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```
clear all;
close all;

awfuldata = readtable('Neonatal_Mortality.xlsx', 'ReadVariableNames', ...
    true, 'Range', 'A1:CA195');

% This mess of ugly corrects the random sequential order year based data
% was arranged in the original dataset, as well as correcting the
% importation as a string value as opposed to a numerical/double

% Cooper explained how to make this work more elegantly, but... meh.

awfulnum(1,:) = str2double(awfuldata.x1990);
awfulnum(2,:) = str2double(awfuldata.x1991);
awfulnum(3,:) = str2double(awfuldata.x1992);
awfulnum(4,:) = str2double(awfuldata.x1993);
awfulnum(5,:) = str2double(awfuldata.x1994);
awfulnum(6,:) = str2double(awfuldata.x1995);
awfulnum(7,:) = str2double(awfuldata.x1996);
awfulnum(8,:) = str2double(awfuldata.x1997);
awfulnum(9,:) = str2double(awfuldata.x1998);
awfulnum(10,:) = str2double(awfuldata.x1999);
awfulnum(11,:) = str2double(awfuldata.x2000);
awfulnum(12,:) = str2double(awfuldata.x2001);
awfulnum(13,:) = str2double(awfuldata.x2002);
awfulnum(14,:) = str2double(awfuldata.x2003);
awfulnum(15,:) = str2double(awfuldata.x2004);
awfulnum(16,:) = str2double(awfuldata.x2005);
awfulnum(17,:) = str2double(awfuldata.x2006);
awfulnum(18,:) = str2double(awfuldata.x2007);
awfulnum(19,:) = str2double(awfuldata.x2008);
awfulnum(20,:) = str2double(awfuldata.x2009);
awfulnum(21,:) = str2double(awfuldata.x2010);
awfulnum(22,:) = str2double(awfuldata.x2011);
awfulnum(23,:) = str2double(awfuldata.x2012);
awfulnum(24,:) = str2double(awfuldata.x2013);
awfulnum(25,:) = str2double(awfuldata.x2014);
awfulnum(26,:) = str2double(awfuldata.x2015);


awful2015 = str2double(awfuldata.x2015);
```

```
awful1990 = str2double(awfuldata.x1990);
```

```
Warning: Variable names were modified to make them valid MATLAB identifier
```

Question 1.

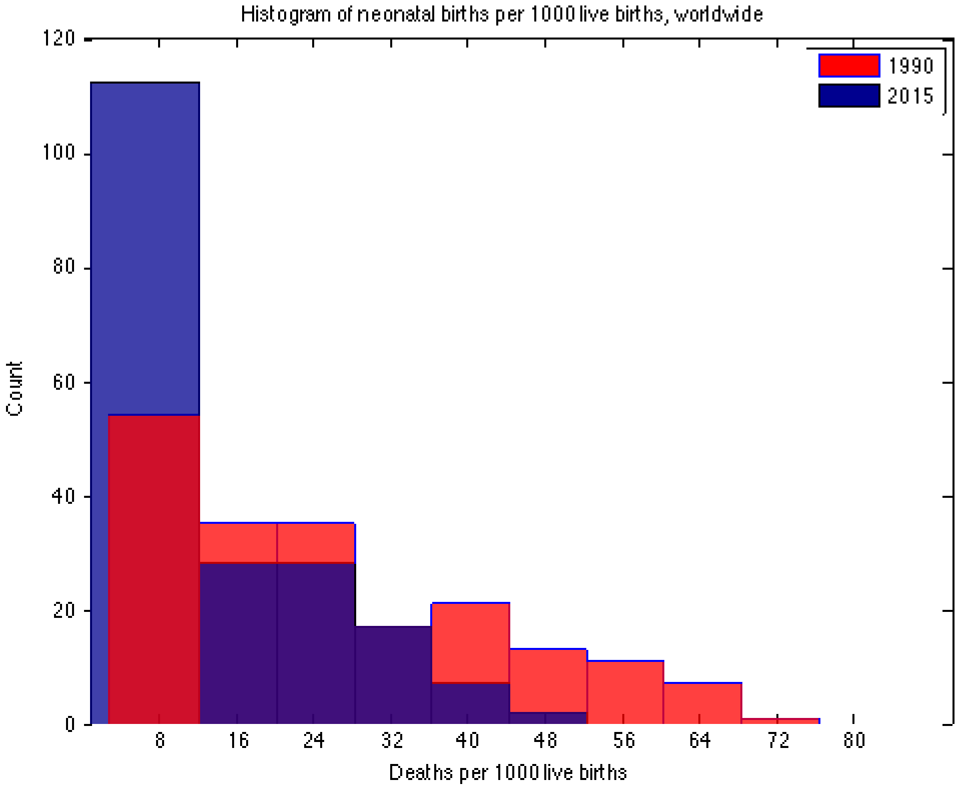
```
numCountries = length(unique(awfuldata.Country))
units = unique(awfuldata.Units)

% There are 194 different countries in this database.
% The units for Neonatal mortality are deaths/1000 live births
```

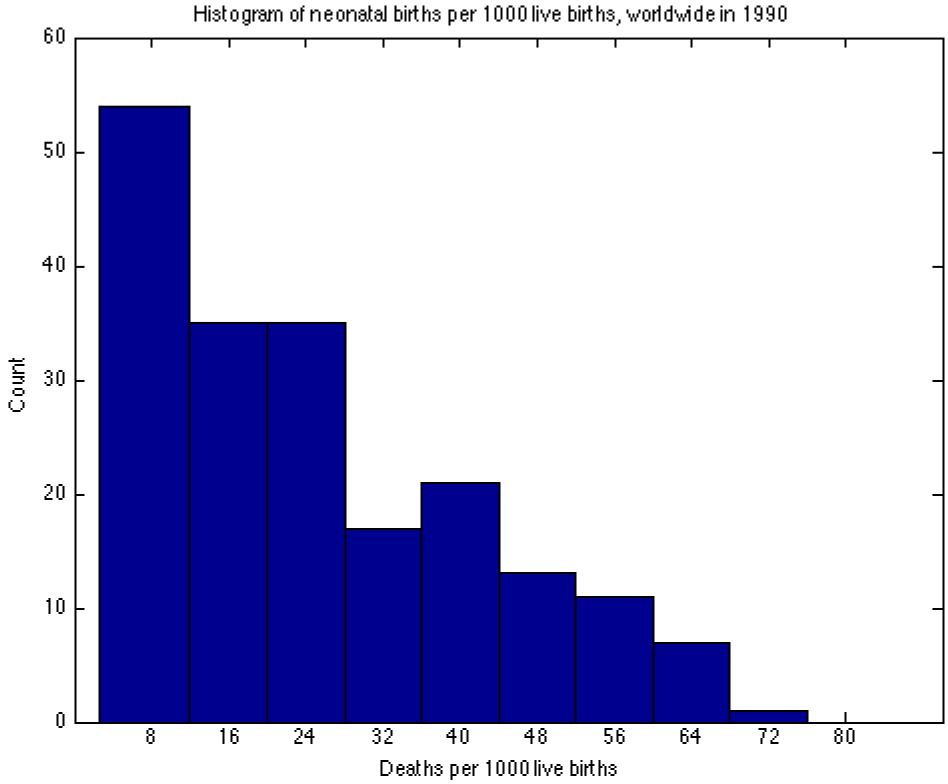
```
numCountries =

   194


units =

    'per 1,000 live births'
```

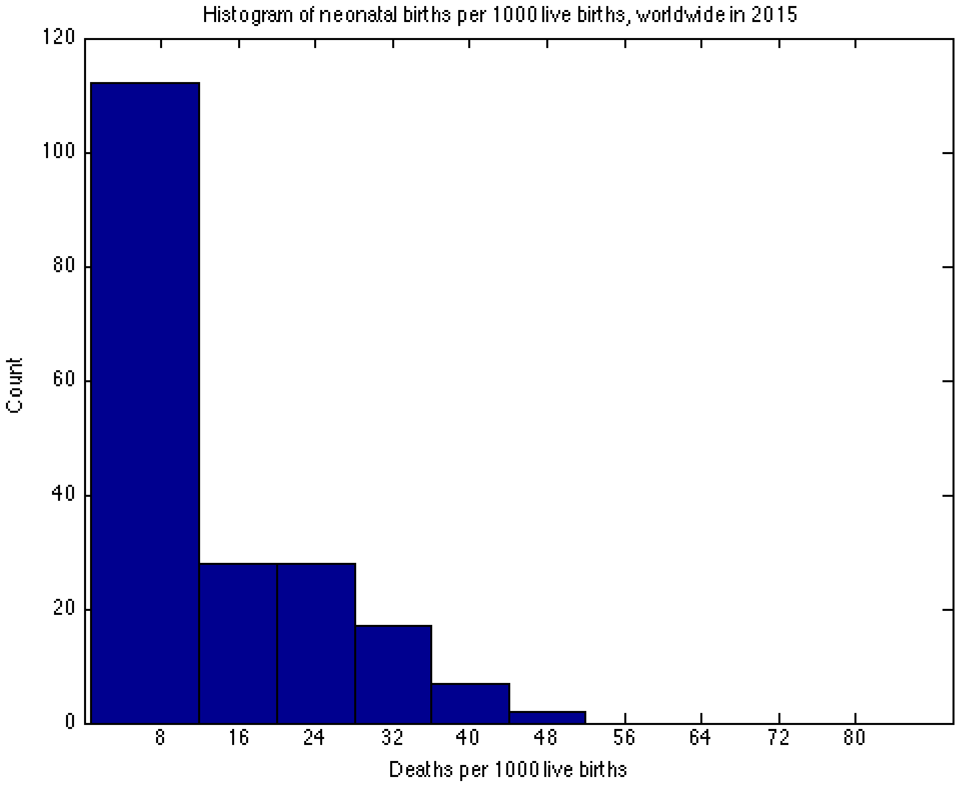
Question 2

```
figure;

hist(awful1990, 8:8:80)
g = findobj(gca, 'Type', 'patch');
set(g, 'FaceColor', 'r', 'EdgeColor', 'b', 'FaceAlpha', 0.75);

hold on;

hist(awful2015,8:8:80)
h = findobj(findobj(gca, 'Type', 'patch'));
set(h, 'FaceAlpha', 0.75);
hold off;
xlabel('Deaths per 1000 live births')
ylabel('Count')
legend('1990', '2015');
title('Histogram of neonatal births per 1000 live births, worldwide')

% I talked to Dr. Brunton and she gave me permission to also turn in the
% two histograms on separate plots, since I have Matlab R2014a, which does
% not have the histogram() command (Came out in R2014b). The above roughly
% approximates the shading histogram() would provide, but the first bin is
% a little wonky?
%

figure;
hist(awful1990, 8:8:80)
xlabel('Deaths per 1000 live births')
```

```
ylabel('Count')
title('Histogram of neonatal births per 1000 live births, worldwide in 1990')

figure;
hist(awful2015, 8:8:80)
xlabel('Deaths per 1000 live births')
ylabel('Count')
title('Histogram of neonatal births per 1000 live births, worldwide in 2015')
```



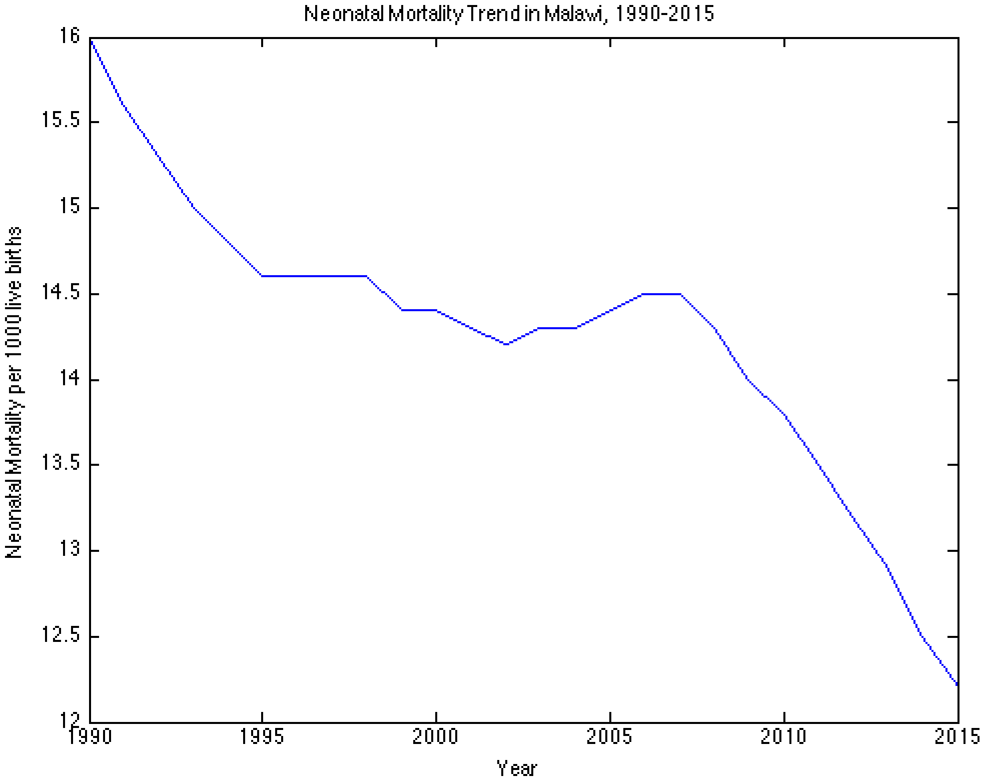

Histogram of neonatal births per 1000 live births, worldwide in 1990
60
50
40
30
20
10
0
Count
8
16
24
32
40
48
56
64
72
80
Deaths per 1000 live births


Histogram of neonatal births per 1000 live births, worldwide in 2015
120
100
80
60
40
20
0
Count
8
16
24
32
40
48
56
64
72
80
Deaths per 1000 live births

Question 3

```
awfulcountryid = find(strcmp('MW', awfuldata.CountryRegionId))

malawidata = awfulnum(:,awfulcountryid);

figure;
plot(1990:2015, malawidata')
ylabel('Neonatal Mortality per 1000 live births');
xlabel('Year');
title('Neonatal Mortality Trend in Malawi, 1990-2015');
```

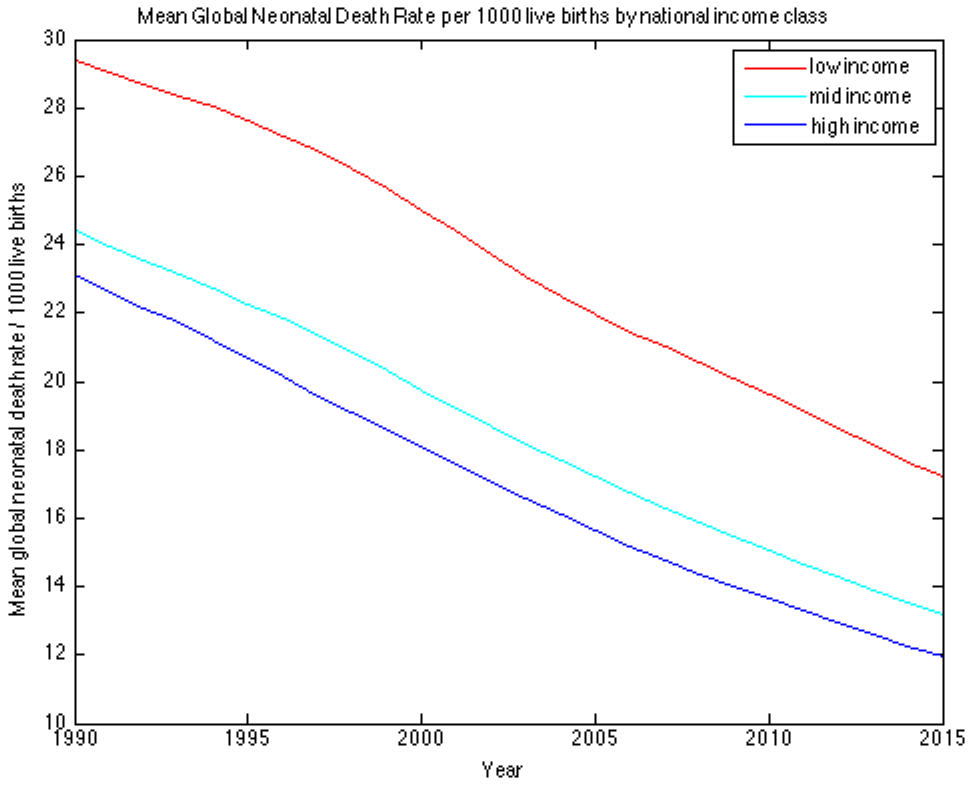
```
awfulcountryid =

   174
```



Question 4

```
awfulnum = awfulnum';
lowinc = find(strcmp('Low income', awfuldata.CountryIncomeGroup));
uncatinc = find(strcmp('-', awfuldata.CountryIncomeGroup));

awfulhighinc1 = find(strcmp('High income: OECD', awfuldata.CountryIncomeGroup)) ;
```

```
awfulhighinc2 = find(strcmp('High income: nonOECD', awfuldata.CountryIncomeGroup))


awfulmidinc1 = find(strcmp('Lower middle income', awfuldata.CountryIncomeGroup));
awfulmidinc2 = find(strcmp('Upper middle income', awfuldata.CountryIncomeGroup));

highinc = vertcat(awfulhighinc1, awfulhighinc2);
midinc = vertcat(awfulmidinc1, awfulmidinc2);

lowdata = awfulnum(lowinc, :);
middata = awfulnum(midinc, :);
highdata = awfulnum(highinc, :);

lowmean = mean(lowdata,1);
midmean = mean(middata,1);
highmean = mean(highdata,1);

figure;
plot(1990:2015, lowmean, 'r')
hold on;
plot(1990:2015, midmean, 'c');
plot(1990:2015, highmean, 'b');
hold off;
legend('low income', 'mid income', 'high income');
xlabel('Year');
ylabel('Mean global neonatal death rate / 1000 live births');
title('Mean Global Neonatal Death Rate per 1000 live births by national income cla
```



Extra Credit

```
initialdata = awfulnum(:,20); % Year 2000 Neonatal death rates
trainingindicies = randsample(1:194, 125); % random numbers to generate test data
testindicies = 1:194; % Lame hack to get the indicies that aren't in the training

testindicies(ismember(testindicies,trainingindicies)) = []; % deletes any values t

trainingdata = initialdata(trainingindicies, :); % Creates vector of neonatal deat
testdata = initialdata(testindicies, :);  % Creates vector of neonatal death rates

initincomedata = awfuldata.CountryIncomeGroup; % Creates vector of income group da


for(i = 1:length(initincomedata)) % Cleans up income data group to just have High

    if(isequal(initincomedata{i}, 'High income: OECD'))
        initincomedata{i} = 'High';
    elseif(isequal(initincomedata{i}, 'High income: nonOECD'))
        initincomedata{i} = 'High';
    elseif(isequal(initincomedata{i}, 'Lower middle income'))
        initincomedata{i} = 'Mid';
    elseif(isequal(initincomedata{i},'Upper middle income'))
        initincomedata{i} = 'Mid';
    elseif(isequal(initincomedata{i},'Low income'))
```

```
        initincomedata{i} = 'Low';
    end;
end;

niter = 400;
val = zeros(niter,1);

for(i = 1:niter)
trainingindicies = randsample(1:194, 125); % random numbers to generate test data
testindicies = 1:194; % Lame hack to get the indicies that aren't in the training

testindicies(ismember(testindicies,trainingindicies)) = []; % deletes any values t

trainingdata = initialdata(trainingindicies, :); % Creates vector of neonatal deat
testdata = initialdata(testindicies, :);  % Creates vector of neonatal death rates

trainingincome = initincomedata(trainingindicies); % Creates a vector of income gr
testincome = initincomedata(testindicies);

test = categorical(trainingincome); % Turns trainingincome into a catagorical vari
classify(testdata, trainingdata, test', 'Linear'); % Actual classify call taht ret

val(i,1) = mean(ismember(classify(testdata, trainingdata, test', 'Linear'), testin

end;

mean(val)

% I spent probably 3 hours working on the homework, plus another 2-3
% helping my group.
```

```
        ans =

            0.9237
```

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