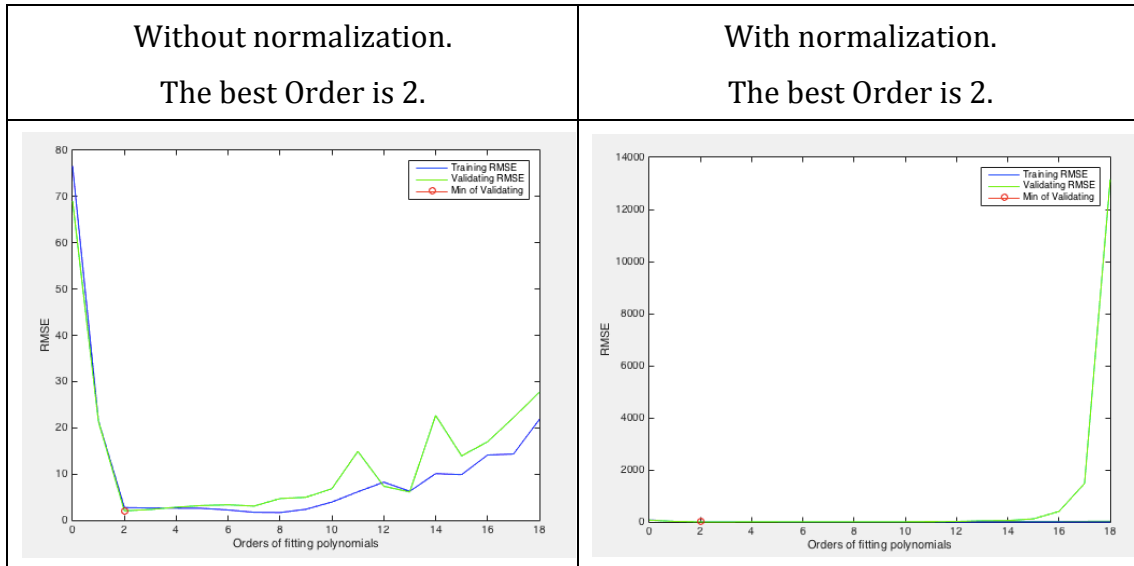


HW17 M12

Answer (for reference only)

1.



Code:

```
load census.mat
data = [cdate'; pop'];
maxOrder = 19-1;
showPlot = 1;
bestOrder = polyOrderSelect(data, maxOrder, showPlot)

figure
cdateMean = mean(cdate);
cdateStd = std(cdate);
cdate = (cdate-cdateMean)/cdateStd;
data1 = [cdate'; pop'];
bestorder1 = polyOrderSelect(data1, maxOrder, showPlot)
```

```

function bestOrder=polyOrderSelect(data, maxOrder, showPlot)
size_of_data = size(data(1, :),2);
RMSE_valid = zeros(1, maxOrder+1);
RMSE_training = zeros(1, maxOrder+1);
    for i = 0:maxOrder
        for k = 1:size_of_data
            training_data = data;
            testing_data = data(:, k);
            training_data(:,k) = [];
            theta = polyfit(training_data(1, :), training_data(2, :), i);
            y2 = zeros(1, size_of_data-1);
            for j = 1:size_of_data-1
                y2(j) = polyval(theta, training_data(1, j));
            end
            RMSE_training(i+1) = RMSE_training(i+1) + sqrt(mean((y2 -
training_data(2, :)).^2));
            y = polyval(theta, testing_data(1, 1));
            RMSE_valid(i+1) = RMSE_valid(i+1) + sqrt(mean((y - testing_data(2, 1)).^2));
        end
        RMSE_training(i+1) = RMSE_training(i+1)./size_of_data;
        RMSE_valid(i+1) = RMSE_valid(i+1)./size_of_data;
    end
    if showPlot == 1
        x = 0:maxOrder;
        plot(x, RMSE_training, 'b', x, RMSE_valid, 'g');
        hold on
    end
    [M, I] = min(RMSE_valid);
    if showPlot ==1
        plot(I-1, M, 'r-o');
        legend('Training RMSE', 'Validating RMSE', 'Min of Validating');
        xlabel('Orders of fitting polynomials');
        ylabel('RMSE');
    end
    bestOrder = I - 1; % order start from 0
end

```