Table of Contents

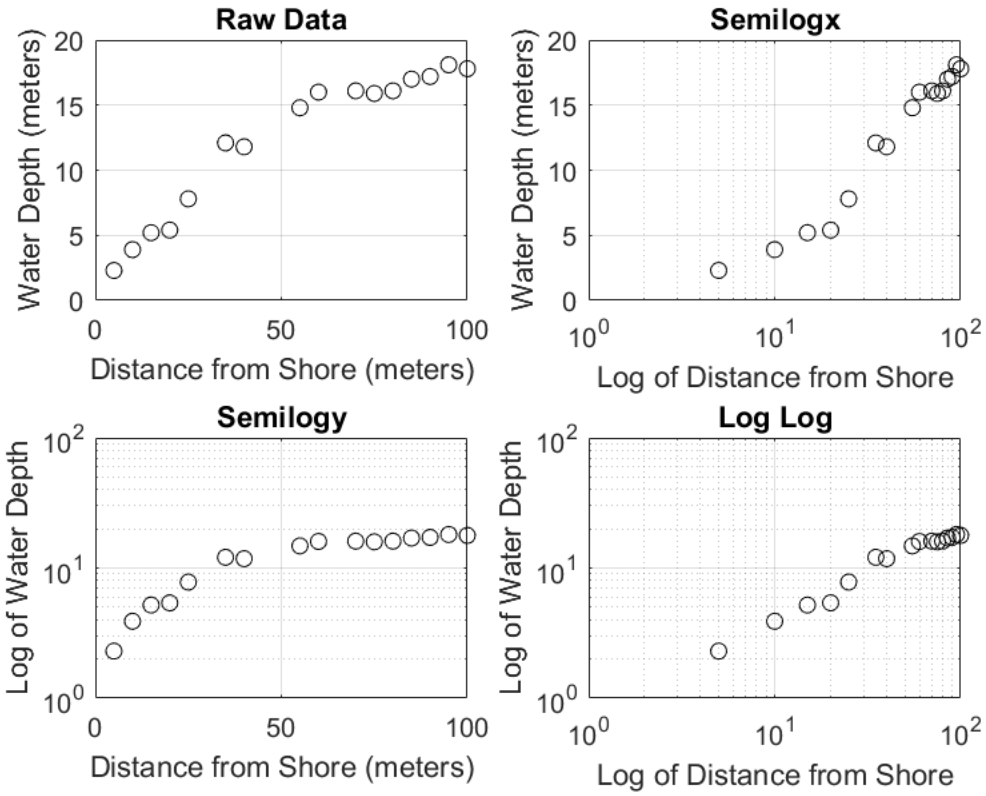

```
function [Depth_value] = PS07_beach_profile_template(Distance_value)

%re%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%
% ENGR 132
% Program Description
%   ... The function takes an input vector of distance from shore
 values
%   and outputs a prediction of the water depth at that distance
%
% Function Call
%  ... PS07_beach_profile_template(Distance_value)
%
% Input Arguments
%   1. ... Distance_value vector
%
% Output Arguments
%   1. ... Depth_value vector
%
% Assigment Information
%   Assignment:       PS 07, Problem 2
%   Author:             Andrew Sartorio, asartor@purdue.edu
%   Team ID:            005-12
%   Paired Programmer:  Harith Kolaganti, hkolagan@purdue.edu
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

INITIALIZATION

```
%Loads data and defines variable vectors
Beach_data = csvread('Data_beach_measurements.csv', 2, 0);
Distance = Beach_data(:,1);
Depth = Beach_data(:,2);
```

FUNCTION DISCOVERY SUBPLOTS

```
%Plots the raw data, semilogx, semilogy, and log log in one window, to
%determine which one yields linear data
figure
subplot(2,2,1)
plot(Distance, Depth, 'ko')
xlabel('Distance from Shore (meters)')
ylabel('Water Depth (meters)')
title('Raw Data')
grid on
subplot(2,2,2)
semilogx(Distance, Depth, 'ko')
xlabel('Log of Distance from Shore')
ylabel('Water Depth (meters)')
title('Semilogx')
grid on
subplot(2,2,3)
semilogy(Distance, Depth, 'ko')
xlabel('Distance from Shore (meters)')
ylabel('Log of Water Depth')
title('Semilogy')
grid on
subplot(2,2,4)
loglog(Distance, Depth, 'ko')
xlabel('Log of Distance from Shore')
ylabel('Log of Water Depth')
title('Log Log')
grid on
```

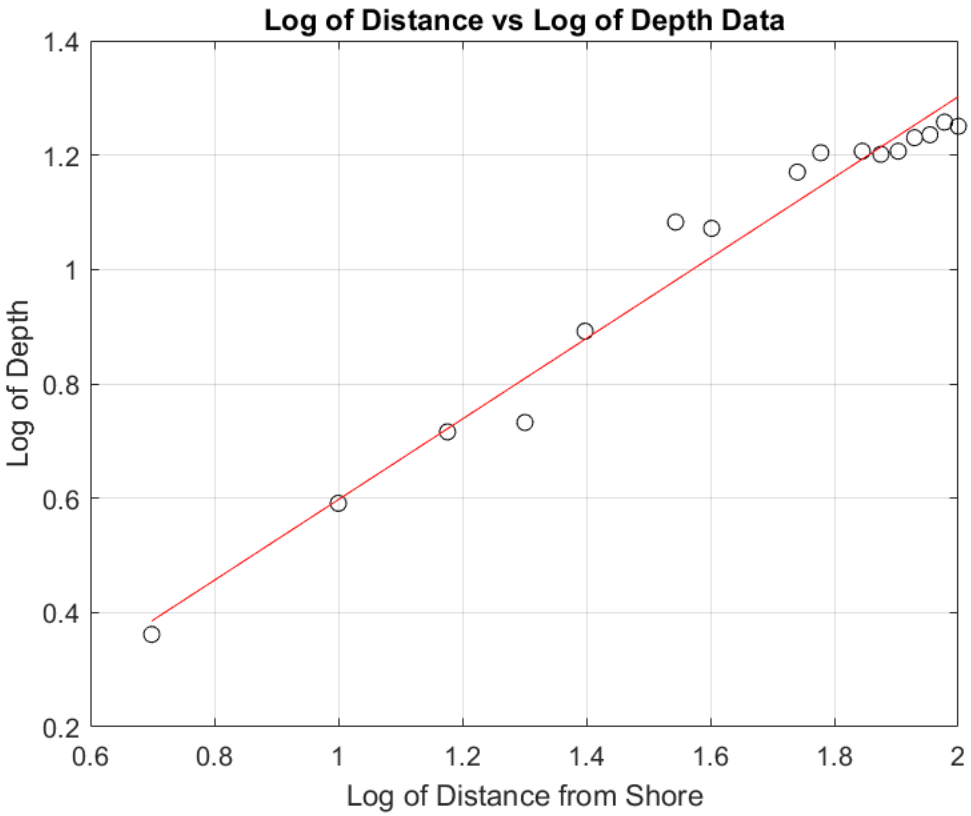


LINEARIZED DATA

```
%Fits the data with a best fit line, assigns coefficients m and b to
 vector
%P(1)
P1 = polyfit(log10(Distance), log10(Depth), 1)
fitted_data = polyval(P1, log10(Distance));
%Linearized equation
log_of_Depth = P1(1)*(log10(Distance)) + P1(2);
fprintf('The linearlized equation is the log of the Depth value is
 %.3f(log of Distance) + %.3f.\n', P1(1), P1(2))
%Plots the log log graph of the data with the best fit line over it
figure
plot(log10(Distance), log10(Depth), 'ko')
hold on
plot(log10(Distance), fitted_data, 'r-')
xlabel('Log of Distance from Shore')
ylabel('Log of Depth')
title('Log of Distance vs Log of Depth Data')
grid on


P1 =
```

```
    0.7048   -0.1075
```

The linearlized equation is the log of the Depth value is 0.705(log of Distance) + -0.107.

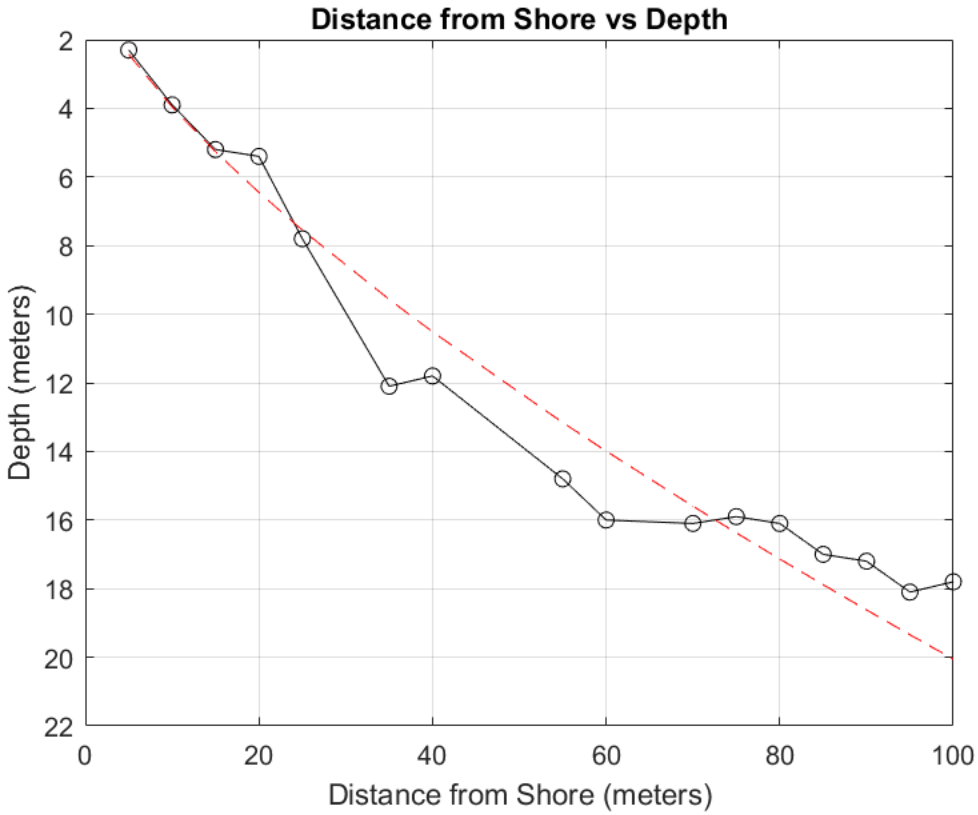


BEACH PROFILE MODEL

```
%y = b * x^m
%Depth_value = 10^P1(2)*(Distance_value)^P1(1)
fprintf('The generalized equation is Depth is equal to 10^
%.3f*(Distance Value)^%.3f', P1(2), P1(1))
%plots the raw data with the fitted best fit line of the data
profile_y = (10^(P1(2)))*((Distance).^P1(1));
figure
plot(Distance, Depth, 'ko-')
hold on
plot(Distance, profile_y, 'r--')
xlabel('Distance from Shore (meters)')
ylabel('Depth (meters)')
title('Distance from Shore vs Depth')
ax3 = gca;
set(ax3,'Ydir','reverse')
```

```
grid on
```

The generalized equation is Depth is equal to 10^-0.107(Distance Value)^0.705*



BEACH PREDICTION

```
Depth_value = (10^(P1(2)))*((Distance_value).^P1(1))
```

Depth_value =

```
    7.5486   12.3039   20.0549   23.4707   26.6893
```

ans =

```
    7.5486   12.3039   20.0549   23.4707   26.6893
```

ANALYSIS

-- Q1

The log-log graph appears to best represent the relationship beween the data. In the figure window, the log-log graph, with axis scaled by 10^n, produces a linear model of the data.

-- Q2

Mr. McGuire, The depths of the pylons, based on a linearized model of the water depth vs distance from the shore, are 7.5486 12.3039 16.3741 20.0549 23.4707 and 26.6893 respectively.

ACADEMIC INTEGRITY STATEMENT

I/We have not used source code obtained from any other unauthorized source, either modified or unmodified. Neither have I/we provided access to my/our code to another. The project I/we am/are submitting is my/our own original work.

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