ME 1020 Engineering Programming with MATLAB

Problem 5.1:

1.* *Breakeven analysis* determines the production volume at which the total production cost is equal to the total revenue. At the breakeven point, there is neither profit nor loss. In general, production costs consist of fixed costs and variable costs. Fixed costs include salaries of those not directly in-volved with production, factory maintenance costs, insurance costs, and so on. Variable costs depend on production volume and include material costs, labor costs, and energy costs. In the following analysis, assume that we produce only what we can sell; thus the production quantity equals the sales. Let the production quantity be Q, in gallons per year.

Consider the following costs for a certain chemical product:
- Fixed cost: $3 million per year.
- Variable cost: 2.5 cents per gallon of product.

The selling price is 5.5 cents per gallon.
Use these data to plot the total cost and the revenue versus Q, and graphically determine the breakeven point. Fully label the plot and mark the breakeven point. For what range of Q is production profitable? For what value of Q is profit a maximum?

Problem setup:

Production costs = fixed cost + variable costs = fixed cost + Production cost/gallon

Revenue = Price/gallon * gallons/year

```
% Problem 5.1
clear
clc
disp('Problem 5.1: Scott Thomas')

Q = 10^6:1000:2*10^8;
Production_cost = 3*10^6 + 0.025*Q;
Revenue = 0.055*Q;

plot(Q,Production_cost, Q,Revenue),xlabel('Gallons of Product'),...
    ylabel('Production Cost and Revenue ($)'), grid on,...
    legend('Production Cost','Revenue','Location', 'SouthEast')
    title('Breakeven Analysis (Problem 5.1) by Scott Thomas')
```

Breakeven Analysis (Problem 5.1) by Scott Thomas