Problem X. Answer the following short coding questions.

As a baker, you have recorded the number of gingerbread houses you've built during the holiday season. The number of gingerbread houses built on a certain day is stored in the vector `houses` and the corresponding day is stored in the vector `days`. The vectors are guaranteed to be the same length.

As an **example**, your data may look something like

```
houses = [5 11 17 25 40]

days = [1 2 5 10 11]
```

Write 1-10 line of code to accomplish each of the following tasks in the provided space. You should NOT write functions, and do not hardcode for the given example.

a. Using linear extrapolation, estimate the day at which the bakery has made approximately 55 gingerbread houses. Store your answer in the variable **`A`**.

```
A = interp1(houses, days, 55, 'linear', 'extrap')
```

OR

```
A = interp1(houses, days, 55, [], 'extrap')
```

b. Find the numerical second derivative of houses with respect to days. Store the vector of second derivatives in the variable **`B`**. When finding the second derivative, omit the last value in `days`.

```
first = diff(houses) ./ diff(days)
B = diff(first)  ./ diff(days(1:end - 1)
```

c. Find the highest order unique best fit polynomial for the original `houses` vs. `days` data. Then, calculate the **analytical integral** of this polynomial. Use zero as the constant of integration. Store the coefficients in the variable `coeffs`. Using this approximation, determine the total number of houses built after 31 days of business. Store your answer in the variable **`C`**.

```
approx = polyfit(days, houses, length(houses) - 1)

coeffs = polyint(approx)

C  = polyval(coeffs, 31)
```

d. Plot the following in a 2 X 1 subplot. You may use the variables `houses`, `days`, and `A` (from part a).

1. In the top plot, plot the original data with days on the x-axis and houses on the y-axis. Use green plus signs. Plot the data point found in Part A using a red diamond. (5 points)

2. In the bottom plot, plot a magenta square with side-length 3 with the bottom left corner at the origin. (5 points)

Write your code here:

```
subplot(2, 1, 1)
plot(days, houses, 'g+', A, 55, 'rd')
subplot(2, 1, 2)
x = [0 3 3 0 0]
y = [0 0 3 3 0]
plot(x, y, 'm')
```