COMMON PITFALLS: HW 1, PART 2

1. About this document

As part of an ongoing research project to provide high quality autonomous feedback in online courses, we are making this list of common errors from Homework 1 available to all current students. This list was generated by automatically mining "exemplar submissions" from hundreds of thousands of submissions in the previous iteration of this course. If you have any questions, complaints or general feedback, please email codewebresearch@gmail.com. And stay tuned for the release of our interactive feedback tool in a future homework!

2. Common Errors

Error 1. (Forgetting about the ones column of X)

A common error was to forget that the first column of X was set to be all ones. The following code, for example, would have worked if instead of $X(i)$, we had used $X(i, 2)$:

```
function J = computeCost (X, y, theta)
  m = length (y);
  J = 0;
  for i = 1:m
    J = J + (theta (1) + theta (2) * X (i) - y (i)) ^ 2
  endfor;
  J = J / (2 * m)
```

Error 2. (Forgetting to divide by $2m$)

```
function J = computeCost (X, y, theta)
  m = length (y);
  J = 0;
  J = sum ((X * theta - y) .^ 2)
```

Error 3. In this error, the $X(2)$ should have been an $X(:, 2)$.

```
function J = computeCost (X, y, theta)
  m = length (y);
  J = 0;
  J = 1 / (2 * m) * sum ((theta (1) + theta (2) * X (2) - y) .^ 2);
```

Error 4. (Not squaring the prediction error)

```
function J = computeCost (X, y, theta)
  m = length (y);
  J = 0;
  J = sum (X * theta - y) / (2 * m)
```

Error 5. (Multiplying X by θ in the wrong order)
In the following example, $\theta \cdot X(i, :)$ returns a 2×2 matrix — it *should* be $X(i, :) \cdot \theta$ instead.

```
function J = computeCost (X, y, theta)
  m = length (y);
  J = 0;
  for i = 1:m
    J = J + (theta * X (i, :) - y (i)) ^ 2;
  endfor;
  J = J / (2 * m)
```

Error 6. (Missing parentheses) In the following submission, octave interprets the 1/2*m as $(1/2)m$ rather than $1/(2m)$.

```
function J = computeCost (X, y, theta)
  m = length (y);
  J = 0;
  h = X * theta;
  J = 1 / 2 * m * sum ((h - y) .^ 2);
```

Error 7. (Reloading data within the function)

A number of students submitted code that reloaded the data inside the function, overwriting the data that was passed in via the parameters.

```
function J = computeCost (X, y, theta)
  data = csvread ('ex1data1.txt');
  y = data (:, 2);
  m = length (y);
  X = [ones(m, 1), data(:, 1)];
  theta = zeros (2, 1);
  iterations = 1500;
  alpha = 0.01;
  J = 0;
  h = 0;
  for i = 1:m
    h = h + (theta' * X (i, :)' - y (i)) ^ 2;
  endfor;
  J = 1 / (2 * m) * h
```