MECH 105: Homework 3

Problem 1

Write a MATLAB function that estimates a hikers altitude based on the temperature of their boiling water.

Given:

$$p = 29.921(1 - 6.8753 * 10^{-6}h)^{5.2559}$$

$$T_b = 49.161ln(p) + 44.932$$

where p is the atmospheric pressure in inches of mercury, T_b is the boiling temperature in $^\circ F$, and h is altitude in feet.

MATLAB Function Template

Use the template below as a starting point or as a hint. Edit as necessary. Or as Stevie Nicks would say, "You can go your own way."

```
function altitude = boil2alt(boilTemp, degreeUnit)
% [insert appropriate help information here]

% Use nargin to set degreeUnit to F
% [insert code here]

% Check to see if degreeUnit was input correctly
% [insert code here]

% Check if boilTemp is in range indicated
% [insert code here]

% Meat and potatoes (do the algebra by hand first!)
% [insert code here]

end

% Put subfunction down here
% [insert code here]
```

Additional Function Specifications

- The function should be able to accept a boiling temperature from $0°F$ to $300°F$. Anything not in that range should throw an error.
- The help information should include a description of the function, inputs, and output as well as their respective limits.
- The `degreeUnit` variable should be a character that indicates the user is using celsius or fahrenheit. The options should be either `c`, `C`, `f`, or `F`. If the user types something other than those, it should throw an error.
- All error should use the MATLAB `error()` function.
- If a user does not specify a value for `degreeUnit` it should default to $°F$
- Your function needs to contain another function that converts from $°C$ to $°F$ when necessary. You can call the subfunction anything that makes sense.
- If the user types in too many, or too few input arguments, the function should throw an error.
- Hint: when solving the equations you may need to use the MATLAB function `nthroot()`