1) (3 pts) A freely hanging cable forms the shape of a hyperbolic cosine curve of the form

$$y = a\cosh\left(\frac{x}{a}\right)$$

where $a = \dfrac{T}{w}$. T is the tension in the cable and w is the weight per unit length of the cable. Write a program that will read in values of T, w, x and print out the value of y. Test your program using the values $T = 750.4, w = 1.3, x = 12.2$

2) (4 pts) Write a program that will read in a set of coordinates (x_1, y_1) and (x_2, y_2) and determine the slope and y-intercept of the line between them. Test your program for the points (-2,3) and (5,-5). Also, devise a test case for which your program will fail.

3) a) (2 pts) Suppose y is a double precision variable. If you try to compute

```
y = ACOS(2.3d0)
```

the compiler will generate an error. Why? Don't just state the error message you get; you should explain why this makes no sense mathematically.

b) (2 pts) If y is double precision. If you compute

```
y = ATAN(2.3d0)
```

this will work. Why? Again, don't just state the error message you get; you should explain why this calculation is feasible.

4) (6 pts) Given a set of coordinates (x, y) in the x-y plane, the polar form of the coordinates is given by (r, θ) where

$$r = \sqrt{x^2 + y^2}, \quad \theta = \tan^{-1}\left(\frac{y}{x}\right).$$

Write an F90 program that will ask the user to input a set of rectangular coordinates, (x, y) and output the coordinates in polar form. The polar angle should be printed out in degrees. Test your program using the rectangular coordinates (-1,1), (-4,-2), (0,-3).