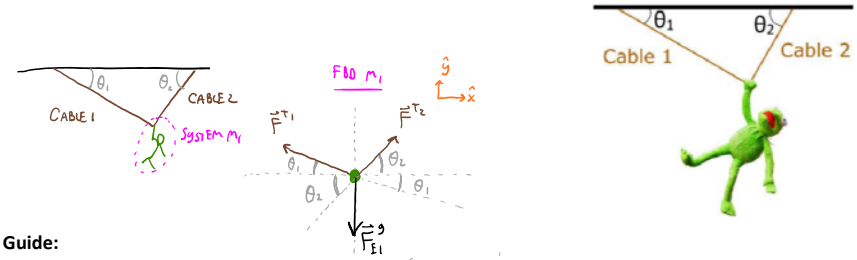
Week 5 Challenge homework Solutions

A chandelier with mass m is attached to the ceiling of a large concert hall by two cables. Cable 1 has tension T_1 and makes an angle of θ_1 with the ceiling. Cable 2 has tension T_2 and makes an angle of θ_2 with the ceiling.

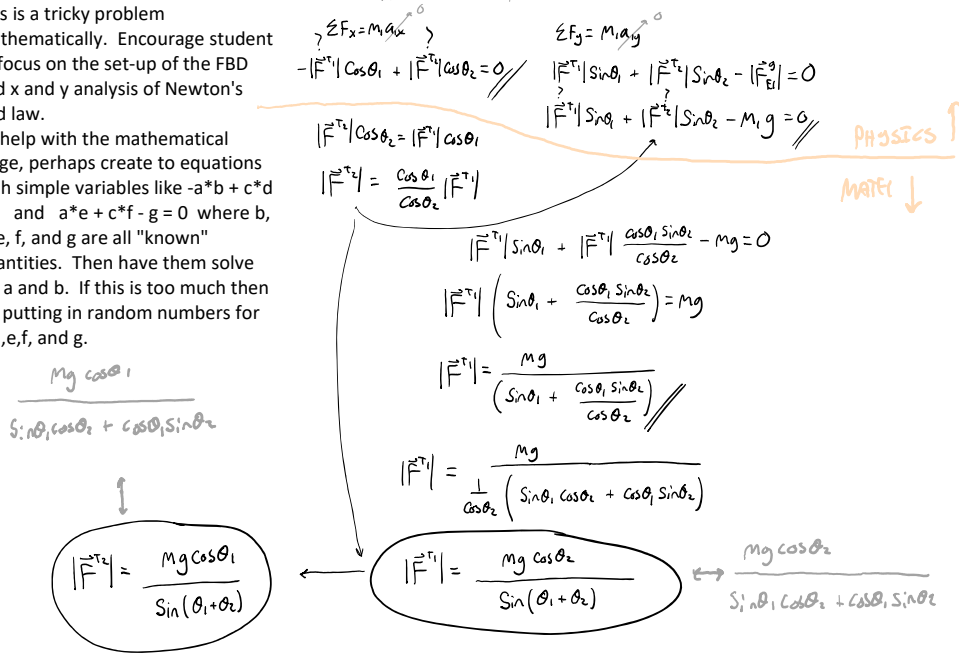
(a) (a) Find an expression for T_1, the tension in cable 1, that does not depend on T_2. Express your answer in terms of some, or all of the variables m, θ_1, θ_2, and the magnitude of the acceleration due to gravity g.

(b) (b) Use the *Special Cases* sense-making technique to check your expression in part (a). Specifically how does the tension change as m, θ_1, θ_2, and **g** change to extreme values?



Instructor Guide:

1. This is a tricky problem mathematically. Encourage student to focus on the set-up of the FBD and x and y analysis of Newton's 2nd law.
2. To help with the mathematical stage, perhaps create to equations with simple variables like -a*b + c*d = 0 and a*e + c*f - g = 0 where b, d, e, f, and g are all "known" quantities. Then have them solve for a and b. If this is too much then try putting in random numbers for b,d,e,f, and g.



Solution to problem 2 coming soon!