Question 1
A 50 foot ladder has its upper end on a vertical wall and its lower end on a horizontal floor.
Its lower end is slipping away from the wall at a constant rate of 1 foot per second.
How fast is its upper end moving when the lower end is 30 feet away from the wall?
As the ladder falls does the upper end accelerate or decelerate? Explain.

Question 2
Let \( f(x) = x^3 - 3x^2 - 9x + 20 \), defined for any real \( x \).
- Sketch the graph of the function \( f \).
- Prove that the function \( f \) has a unique zero in the interval \([0, 3]\).
- Using Newton’s method with at least three iterations for a suitable starting value, estimate the position of the zero.
- By factoring the function \( f \), or otherwise, compare your results with the exact value for the zero.

Question 3
A basket is strung between two (vertical) trees on horizontal ground.
The trees are 20 meters apart.
On rope is attached to a tree at a height of 20 meters.
The other rope is attached to the other tree at a height of 25 meters.
The basket is 10 meters above the ground and is vertically above a point half-way between the two trees.
If the basket has a mass of 80 kilograms, find the forces in the ropes (assuming that the ropes are straight and of negligible thickness and neglecting the weight of the ropes themselves).