You are in the process of designing a UAV and are interested in its taxi performance. For a variety of reasons you want it to be able to "takeoff" without rotation (e.g. B-52). For the information provided determine the elevator deflection required for this to occur and estimate the ground-roll distance.

- Wing area = 8 ft$^2$
- Wing reference chord = 1 ft
- Horizontal tail reference area = 2 ft$^2$
- Weight = 10 lb
- Static Thrust = 2.5 lb
- Wing/Body Clalpha = 0.08 /deg
- Wing/Body Cdo = 0.02
- Wing/Body k= 0.04
- Wing/Body Cmac = -0.02
- Wing/Body incidence angle* (on gear) = 5 deg
- Horizontal tail Clalpha = 0.07 /deg
- Horizontal tail Cldeltae = 0.04 /deg
- Body Station for cg = 2 ft
- Body Station for nose gear = 0.33 ft
- Body Station for main gear = 2.4 ft
- Body Station for Wing/Body AC = 2.4 ft
- Body Station for Horizontal Tail AC = 4.0 ft
- Nominal landing gear length = 0.5 ft

*(incidence angles for wing/body and horizontal tail are measure from their respective zero lift lines)

Your project memo should include:
- Aircraft model development with FBD and all appropriate terminology
- Equations of motion
- Description of method of solution
- Benchmark or validation studies
- Desired "design" results