QUIZ on Lecture P1_Wk4_L2

1. When the tip jumps into contact with the substrate
   a) the slope of the force vs. distance curve equals k, the spring constant of the microcantilever
   b) the slope of the force vs. distance curve equals 1/k, where k is the spring constant of the microcantilever
   c) the curvature of the microcantilever equals the slope of the force vs. distance curve
   d) the displacement of the microcantilever equals the slope of the force vs. distance curve

2. In equilibrium, a non-zero cantilever deflection is observed when a tip is positioned a distance \( z \) above a substrate. The cantilever deflection
   a) produces a force that counteracts the tip-substrate interaction
   b) produces a force that adds to the tip-substrate interaction
   c) produces no force
   d) produces a force that causes the cantilever to twist

3. In general, once the tip jumps into contact with the substrate,
   a) the tip will become permanently embedded in the substrate
   b) the tip will immediately rebound from the substrate due to a restoring force produced by the cantilever
   c) the tip will remain in contact until a sufficiently large lift-off force is applied
   d) the tip will be repelled back to its original position by the tip-substrate vdW interaction

4. To a very good approximation, the jump to contact phenomenon occurs at a
   a) constant value of \( d \)
   b) constant value of \( q \)
   c) constant value of \( z \)
   d) constant value of \( d^2 \)