1. Consider the following configuration:

Indicate the direction of friction (right, left or indeterminate) for the following cases:

Case 1: \( P = 80 \text{ N} \) (1 point)
\[ P \cos 60^\circ < 100N \] (tendency of motion to the left, hence, friction to the right)

Case 2: \( P = 100 \text{ N} \) (1 point)
\[ P \cos 60^\circ < 100N \] (tendency of motion to the left, hence, friction to the right)

Case 3: \( P = 200 \text{ N} \) (1 point)
\[ P \cos 60^\circ = 100N \] (no tendency of motion, hence, no friction; direction indeterminate)

Case 4: \( P = 300 \text{ N} \) (1 point)
\[ P \cos 60^\circ > 100N \] (tendency of motion to the right, hence, friction to the left)

2. Refer to the above configuration, if \( \mu_s = 0.2, \mu_k = 0.1 \) and \( m = 10 \text{ kg} \). Assume \( g = 10 \text{ m/s}^2 \), give the magnitude of friction in Case 2 (6 points)

\[
\sum F_x = 100N \cos 60^\circ - 100N = -50N
\]

\[
\sum F_y = -100N \sin 60^\circ - (10 \text{ kg})(10 \text{ m/s}^2) + N = 0 \Rightarrow N = 187N
\]

maximum static friction = \( \mu_s N = (0.2)(187N) = 37.3N \) (to the right) < \( \left| \sum F_x \right| \) (motion occurs)
kinetic friction = \( \mu_k N = (0.1)(187N) = 18.7N \) (to the right)