Q1

Rock: 2 km/h
Smooth: 5 km/h
Sandy: 3 km/h

Route 2 is the fastest

R1: 2 kilometers

Rocky -> 50% chance of 60 mins
Smooth -> 30% chance of 24 mins
Sandy -> 20% chance of 40 mins

R2: 1.8 kilometers

Rocky -> 40% chance of 54 mins
Smooth -> 20% chance of 21.6 mins
Sandy -> 40% chance of 36 mins

R3: 3.1 kilometers

Rocky -> 10% chance of 93 mins
Sandy -> 50% chance of 62 mins
Smooth -> 40% chance of 37.2 mins

$R_1 \rightarrow (.5)(60) + (.2)(40) + (.3)(24) = 45.2$

$R_2 \rightarrow (.4)(54) + (.4)(36) + (.2)(21.6) = 40.32$

$R_3 \rightarrow (.1)(93) + (.5)(62) + (.4)(37.2) = 55.48$

Part 2

Normalized

$R_1 \rightarrow 45.2 + (.3)(45) + (.7)(0) = 58.7$

$R_2 \rightarrow 43.32 + (.6)(60) + (.4)(0) = 76.32$

R_3 has no change

Part 3

$R_1 \rightarrow \sim 58.7$ mins

$R_2 \rightarrow \sim 76.32$ mins

$R_3 \rightarrow \sim 55.18$ mins

$(.1/.6)(93) + (.5/.6)(62) = 67.17$

R_3 is not the shortest utility with any new info.

R_1 is the best because of this, we dont want to wait longer than 3 mins to know if R_3 is smooth

Part 4.

I put the question into ChatGPT (4) and it generated the wrong answer. It said that route 1 was the most optimal because of this wrong answer it generated the wrong utils, saying it was worth waiting almost 8 mins