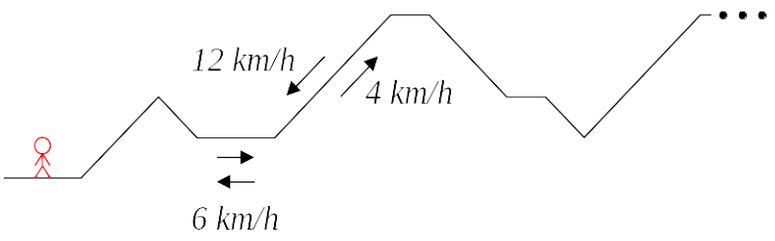
Mathematics 1110H – Calculus I: Limits, derivatives, and Integrals
TRENT UNIVERSITY, Winter 2021

Assignment #π
There and Back Again*
Due on Friday, 26 February.

Submission: Scanned or photographed solutions are fine, so long as they are legible. Please try to make sure that they are oriented correctly – if they are sideways or upside down, they're rather harder to mark! Submission as a single pdf is strongly preferred, but other common formats are probably OK in a pinch. Please submit your solutions via Blackboard's Assignments module. If Blackboard does not acknowledge a successful upload, please try again. As a *last* resort, email your solutions to the instructor at: `sbilaniuk@trentu.ca`



Maxie†, a player of games, falls into a primitive 2-D platformer. All the terrain is a combination of level ground and 45° slopes. There is nothing to do but head outwards from the point at which Maxie materialized in the game, so this is what Maxie does. The game's crude mechanics constrain Maxie to travel at a constant 6 km/h on level ground, a constant 4 km/h going uphill, and a constant 12 km/h going downhill. After entirely too long a while Maxie gets bored and returns to the starting point, reaching it exactly six hours after setting out. At no point does Maxie stop or change direction, except (instantaneously!) when turning around to go back, and the nature of the game forces Maxie to precisely retrace the path taken outwards when returning.

1. Determine, as best you can, how many kilometres Maxie covered in the round trip and at what time Maxie turned around to return. *[10]*

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* This is an extra assignment which, should you do it, will expand the pool from which your best five assignments are chosen. Enjoy your Reading Week!

† It is purely a coincidence that your instructor has a son named Max who seems to disappear into his videogames for hours on end. :-)