INSTRUCTIONS:
Fill out the hazard analysis and risk assessment below.
HA-001 should be for the lane departure warning function as discussed in the lecture.
HA-002 should be for the lane keeping assistance function as discussed in the lecture.
Then come up with your own situations and hazards for the lane assistance system. Fill in the HA-003 and HA-004 rows.
When finished, export your spreadsheet as a pdf file so that a reviewer can easily see your work.

Hazard ID	Situational Analysis								
	Operational Mode	Operational Scenario	Environmental Details	Situation Details	Other Details (optional)	Item Usage (function)	Situation Description	Function	Deviation
HA-001	Normal Driving	Highway	Rain (slippery road)	High speed		Correctly used	Normal driving on the highway during rain with high speed and correctly used system	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	Actor effect is too much
HA-002	Normal Driving	Country Road	Normal conditions	High speed		Incorrectly used	Driver takes hands off wheel and incorrectly treats the car as fully autonomous	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	Function always activated
HA-003	Backward Driving	Any road	Normal conditions	Low speed		Correctly used	Driving backwards on any road in normal conditions at low speed and correctly used system	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	Actor effect is re
HA-004	Normal Driving	Off road	Normal conditions	High speed		Incorrectly used	Normal driving off road in normal conditions at high speed with incorrect system use (LKA activated when off road)	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	Sensor detectio

Hazard Identification				Hazardous Event Classificat			
Deviation Details	**Hazardous Event (resulting effect)**	**Event Details**	**Hazardous Event Description**	**Exposure (of situation)**	**Rationale (for exposure)**	**Severity (of potential harm)**	**Rationale (for severity)**
The LDW function applies an oscillating torque with very high torque (above limit).	Collision with other vehicle.	High haptic feedback can affect driver's ability to steer as intended. The driver could lose control of the vehicle and collide with another vehicle or with road infrastructure.	The LDW function applies too high an oscillating torque to the steering wheel (above limit).	E3		S3	High speed collision
lane keeping assistance function is always activated.	Collision with other vehicle.	lane keeping assistance was always on and had no time limit, so drivers could take both hands off the wheel	lane keeping assistance function is always activated.	E2		S3	High speed collision
Car turns opposite direction because it is in reverse	Rear collision with obst	In reverse, steering actions have the opposite effect, so LKA would cause incorrect steering	Car turns opposite direction because it is in reverse	E3	E.g. reverse parallel parking	S1	Low speed
Sensor detects road lines incorrectly when driver activates LKA off road	Front collision with obs	LKA recieves incorrect information from sensor and applies torque to steering unexpectedly	Sensor detects road lines incorrectly when driver activates LKA off road	E1	Off-roading is not that common	S3	High speed collision

tion		Determination of ASIL and Safety Goals	
Controllability (of hazardous event)	**Rationale (for controllability)**	**ASIL Determination**	**Safety Goal**
C3		ASIL C	The oscillating torque from the lane departure warning shall be limited
C3	Because hands aren't on the wheel at high speeds, a vehicle accident would not be controllable	ASIL B	the lane keeping assistance function shall be time limited and the additional steering torque shall end after a given time interval so that the driver cannot misuse the system for autonomous driving
C3	Driver is trying to steer againt LKA torque	ASIL A	Deactivate LKA if in reverse
C3	torque is applied to wheel unexpectedly	ASIL A	System deactivates if driver torque is opposite direction to LKA torque