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	OM03 - Normal driving	OS04 - Highway	EN06 - Rain (slippery road)	SD02 - High speed	N/A	IU01 - Correctly used	Normal driving on highway during rainy conditions with high speed	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	DV04 - Actor effect is too much
HA-002	OM03 - Normal driving	OS03 - Country Road	EN01 - Normal conditions	SD02 - High speed	Driver is not grasping the steering wheel	IU02 - Incorrectly used	Normal driving on country roads during normal conditions with high speed (the driver is misusing the lane keeping assistance function as an autonomous function)	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV03 - Function always activated
HA-003	OM03 - Normal driving	OS03 - Country Road	EN06 - Rain (slippery road)	SD02 - High speed	Road is winding	IU01 - Correctly used	Normal driving on country roads during rainy conditions with high speed with a windy path	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV04 - Actor effect is too much
HA-004	OM03 - Normal driving	OS04 - Highway	EN04 - Snowfall (degraded view)	SD01 - Low speed	Lane marking are obscured	IU01 - Correctly used	Normal driving on the highway during snowy conditions with low speed, lane lines are obscured by snow	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV02 - Function unexpectedly activated

Hazard Identification				Hazardous Event Classification				
Deviation Details	**Hazardous Event (resulting effect)**	**Event Details**	**Hazardous Event Description**	**Exposure (of situation)**	**Rationale (for exposure)**	**Severity (of potential harm)**	**Rationale (for severity)**	**Controllability (of hazardous event)**
The LDW function applies an oscillating torque with very high torque (above limit).	EV00 - 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 - Medium probability	High speed driving on the highway in the rain happens quite frequently	S3 - Life-threatening or fatal injuries	The vehicle is traveling at high speed	C3 - Difficult to control or uncontrollable
LKA is always active	EV00 - Collision with other vehicle	Continously maintaining a lane without speed and environment considerations could lead to collision to a slower moving vehicle in the same lane.	Continuous operation of the LKA	E2 - Low probability	The driver is on country roads and misusing the system	S3 - Life-threatening or fatal injuries	The vehicle is traveling at high speed	C3 - Difficult to control or uncontrollable
The LKA applies a steering angle that is to great for the current vehicle speed	EV03 - Car spins out of control	Applying too great of a steering angle command at a high speed may result in loss of traction or rollover	The LKA applies a steering angle that is too great for the current vehicle speed	E3 - Medium probability	High speed driving on country roads in the rain happens quite frequently	S3 - Life-threatening or fatal injuries	The vehicle is traveling at high speed	C3 - Difficult to control or uncontrollable
The LKA applies a steering command to follow a path that does not correspond to lane markings	EV00 - Collision with other vehicle	Steering commands made in response to obscured lane markings could lead to collision to a vehicle in an adjacent lane	The LKA steers into a neighboring lane due to incorrect lane marking information	E2 - Low probability	Many drivers never deal with snow, others experience it for a few months at most	S2 - Severe and life-threatening injuries	The vehicle traveling at low speed, snow may lead to follow-on collisions	C2 - Normally controllable

	Determination of ASIL and Safety Goals	
Rationale (for controllability)	**ASIL Determination**	**Safety Goal**
The driver will have difficulty overcoming the LDW applied torque	C	The magnitude and frequency of the oscillating torque from the LDW shall be limited
The driver is not grasping the steering wheel, so there is no possibility to control steering	B	Continous activation of the LKA shall be prevented
Once the vehicle loses traction or any wheel leaves the driving surface, the driver will have great difficulty controlling the trajectory	C	Steering angle and rate-of-change of steering angle of the LKA shall be limited as a function of the current vehicle speed
The driver is properly using the system, maintaining a grasp on the steering and need only to steer back into the proper lane	QM	None - QM rating