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)**
HA-001	OM03 - Normal Driving	OS04 - Highway	EN06 - Rain (slippery road)	SD02 - High speed		IU01 - Correctly used
HA-002	OM03 - Normal Driving	OS03 - Country Road	EN01 - Normal conditions	SD02 - High speed		IU02 - Incorrectly used
HA-003	OM03 - Normal Driving	OS04 - Highway	EN01 - Normal conditions	SD02 - High speed		IU01 - Correctly used
HA-004	OM03 - Normal Driving	OS03 - Country Road	EN01 - Normal conditions	SD02 - High speed		IU01 - Correctly used

	Hazard Identification			
Situation Description	**Function**	**Deviation**	**Deviation Details**	**Hazardous Event (resulting effect)**
Normal driving on a highway during rain (slippery road) 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	DV04 - Actor effect is too much	The Lane Departure Warning function applies an oscillating torgue with very high torque (above limit.)	EV00 - Collition with other vehicle.
Normal driving on a country road during normal conditions with high speed and incorrectly used systam.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV03 - Function is always activated	Lane Keeping function is always activated	EV00 - Collition with other vehicle.
Normal driving on a highway during normal conditions 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	DV02 - Function unexpectedly activated	The camera sensor stop working and the Lane Departure Warning function continue to be activated.	EV00 - Collition with other vehicle.
Normal driving on a country road during normal conditions with high speed and correctly used system.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV02 - Function unexpectedly activated	The camera sensor stop working and the Lane Keeping Assistance function continue to be activated.	EV00 - Collition with other vehicle.

		Hazardous Event Classification				
Event Details	**Hazardous Event Description**	**Exposure (of situation)**	**Rationale (for exposure)**	**Severity (of potential harm)**	**Rationale (for severity)**	**Controllability (of hazardous event)**
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 Lane Departure Warning function applies an oscillating torgue with very high torque (above limit.)	E3 - Medium probability	Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collitions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable
Driver use the function as if the car was a self-driving car and loose driving attention.	The driver do not use the function properly.	E2 - Low probability	The conviation beween driving at a country road and misusing system should not happen oftern. Less than 1% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collitions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable
The Lane Departure Warning continue to be activated and start executing random torque to the steering wheel making the driver to loose control with potential collition with other vehicle.	The Lane Departure Warning start acting randomly when the camera sensor is not working.	E3 - Medium probability	Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collitions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable
The Lane Keeping Assistance continue to be activated starting executing random torque to the vehicle making the driver to loose control with potential collition with other vehicle.	The Lane Keeping Assistance start acting randomly when the camera sensor is not working.	E3 - Medium probability	Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collitions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable

	Determination of ASIL and Safety Goals	
Rationale (for controllability)	**ASIL Determination**	**Safety Goal**
It is difficult to stay calm and react properly when the steering well is moving too much.	C	The oscillating steering torque from the Lane Departure Warning function shall be limited.
When the driver loose focus on driving, it is difficult to re-focus in the case of inmminent collition.	B	The Lane Keeping Assistance function shall be time limited, and additional steering torque shall end after a given time interval so the driver cannot misuse the system for autonomous driving.
When the driver loose control of the vechicle is very difficult to realize the situation and act accordently.	C	The Lane Departure Warning function shall be deactivated when the camera sensor stop working.
When the driver loose control of the vechicle is very difficult to realize the situation and act accordently.	C	The Lane Keeping Assistance function shall be deactivated when the camera sensor stop working.