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	EN01 - Normal conditions	SD02 - High speed	N/A	IU01 - Correctly Used
HA-002	OM03 - Normal Driving	OS04 - Highway	EN01 - Normal conditions	SD02 - High speed	N/A	IU02 - Incorrectly Used
HA-003	OM03 - Normal Driving	OS03 - Country Road	EN07 - Snow (slippery road)	SD02 - High speed	N/A	IU01 - Correctly Used
HA-004	OM03 - Normal Driving	OS05 - Mountain Pass	EN01 - Normal conditions	SD01 - Low speed	N/A	IU01 - Correctly Used

	Hazard Identification			
Situation Description	**Function**	**Deviation**	**Deviation Details**	**Hazardous Event (resulting effect)**
Normal driving on highway during normal conditions with high speed.	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	DV10 - Actor effect is reverse	The LDW function applies the torque in the wrong direction to the steering wheel.	EV00 - Collision with other vehicle
Normal driving on highway during normal conditions with high speed.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV03 - Function always activated	The driver is not taking control of the car and using the LKA function to let the car drive fully autonomous.	EV00 - Collision with other vehicle
Normal driving on country roads during snow (slippery road) 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	The LDW function applies to high torque to the steering wheel.	EV00 - Collision with other vehicle
Normal driving on mountain pass during normal conditions with low speed.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV02 - Function unexpectedly activated	The LKA function keeps warning and steering, however, this is due to the very winding road.	EV04 - Car comes off the road

				Hazard
Event Details	**Hazardous Event Description**	**Exposure (of situation)**	**Rationale (for exposure)**	**Severity (of potential harm)**
High haptic feedback can confuse the driver and as a consequence lose control of the vehicle..	The LDW function applies torque in the wrong direction to the steering wheel .	E2 - Low probability	This is a basic functionality error that shouldn't occur in the field as it has been tested for this condition prior to production.	S3 Life-threatening or fatal injuries
The driver is not touching the steering wheel and cannot in time to changing conditions.	The LKA function is not limited in time.	E2 - Low probability	As the LKA function is quite simple in most situations there'll be too much interference where the driver has to take control.	S3 Life-threatening or fatal injuries
High haptic feedback is too much and the driver could oversteer and as a consequence lose control of the vehicle..	The LDW function applies torque above limit to the steering wheel .	E2 - Low probability	Drivers normally take extra caution in snowy conditions.	S3 Life-threatening or fatal injuries
Due to the high frequency of directional changes and the delayed feedback of the LKA, the driver might get confused and lose control of the vehicle.	The LKA function is not limited in time.	E2 - Low probability	This is a basic functionality error that shouldn't occur in the field as it has been tested for this condition prior to production.	S3 Life-threatening or fatal injuries

dous Event Classification			Determination of ASIL and Safety Goals	
Rationale (for severity)	**Controllability (of hazardous event)**	**Rationale (for controllability)**	**ASIL Determination**	**Safety Goal**
Driver is travelling at high speed.	C3 Difficult to control or uncontrollable	The driver will not expect a feedback in the wrong direction and therefore, might be very confused.	ASIL B	The LDW's applied torque direction must be in line with windowed history of previous steering directions.
Driver is travelling at high speed.	C3 Difficult to control or uncontrollable	The driver reacts too late and at high speed the car already travelled a fair distance before he re-gains control over the vehicle.	ASIL B	The LKA function has to be limited in time so the driver has to take control.
Driver is travelling at high speed.	C3 Difficult to control or uncontrollable	The driver is busy staying aware of the snowy road conditions and might react over-sensitive to the feedback.	ASIL B	The LDW function has to use data from the stability sensors to determine road conditions and use an adaptive torque.
Coming off the road on a mountain pass might cause the vehicle to fall into a gorge.	C3 Difficult to control or uncontrollable	The driver is busy following the winding road and is not expecting	ASIL B	The LKA function has to include some kind of hysteresis so it's not over-compensating