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							Function
	Operational Mode	Operational Scenario	Environmental Details	Situation Details	Other Details (optional)	Item Usage (function)	Situation Description	
HA-001	Normal driving	highway	rain (slippery road)	high speed		correctly-used	Normal driving on a highway during rain with high speed with a correctly-used system.	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback.
HA-002	Normal driving	country road	normal conditions	high speed		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
HA-003	Normal driving	highway	EN04 - Snowfall (degraded view)	high speed	snowfall implies more driver concentration is needed	correctly-used	Normal driving on a highway with snowfall at high speed with a correctly-used system.	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback.
HA-004	Normal driving	city road	EN04 - Snowfall (degraded view)	Low speed		correctly-used	Normal driving on a city road with snowfall at low speed in a correctly-used system.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane

Hazard Identification					Exposure (of situation)	Rationale (for exposure)
Deviation	**Deviation Details**	**Hazardous Event (resulting effect)**	**Event Details**	**Hazardous Event Description**	**Exposure (of situation)**	**Rationale (for exposure)**
Actor effect is too much.	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	rain is a frequent occurance
function always activated	The driver takes his hands completely off the steering wheel.	collision with other vehicle	The LKA is intended to assist the driver, not replace him. The vehicle could be in a situation where the assistance does not take into account extra details so does not control the vehicle adequately.	The driver lets the vehicle steer completely.	E2	by definition, normal conditions occur most of them time
DV04 - Actor effect is too much	The LDW function applies a normal oscillating torque while the driver is focused intently on steering in the slow and so loses control of the vehicle.	EV-02 - Side collision with other traffic	The LDW function applies a normal oscillating torque while the driver is focused intently on steering in the slow and so loses control of the vehicle.	The LDW function applies a normal oscillating torque while the driver is focused intently on steering in the slow and so loses control of the vehicle.	E2	snowfall is an occasional occurance
Sensor detection is wrong	The LKA incorrectly detects lane lines and thus incorrectly applies extra torque.	EV03 - Car spins out of control	The roads are splattered with snow making lane line detection difficult so the LKA detects the lane lines incorrectly applying extra torque when not needed.	The roads are splattered with snow making lane line detection difficult so the LKA detects the lane lines incorrectly applying extra torque when not needed.	E2	snowfall is an occasional occurance and, once fallen, it often melts or is plowed away

Hazardous Event Classification				Determination of ASIL and Safety Goals	
Severity (of potential harm)	Rationale (for severity)	Controllability (of hazardous event)	Rationale (for controllability)	ASIL Determination	Safety Goal
S3	traveling at high speed	C3	At high speed and in slippery situation, it could be difficult to regain control of the vehicle and thus allow high-impact collision with other obstacles.	C	The oscillating steering torque from the lane departure warning function shall be limited.
S3	traveling at high speed	C3	A driver with no hands on the wheel is unable to control it and thus unable to prevent a collision.	B	The lane keeping assistance function shall be time-limited and the additional steering torque shall end after a given time internal so that the driver cannot misuse the system for autonomous driving.
S3	traveling at high speed	C3	A driver focused intently on the road and surprised by a shaking steering wheel could easily lose control.	B	The system shall have an off button allowign the driver to disable this function in adverse whether conditions.
S1	traveling at low speed	C3	A vehicle that turns the wheel outside of the lane is difficult to control by the driver and turning the wheel back would only make the car steer further out of the way.	QM	The system shall have an off button allowign the driver to disable this function in adverse whether conditions.