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
HA-001	(OM03) Normal driving	(OS04) Highway	(EN06) Rain (slippery road)	(SD02) High speed		(IU01) Correctly used	(OM03) Normal driving on a (OS04) Highway during (EN06) Rain (slippery road) with (SD02) High speed and (IU01) Correctly used system.
HA-002	(OM03) Normal driving	(OS03) Country Road	(EN01) Normal conditions	(SD02) High speed	the driver is misusing the lane keeping assistance function as an autonomous	(IU02) Incorrectly used	(OM03) Normal driving on a (OS03) Country Road during (EN01) Normal conditions with (SD02) High speed the driver is misusing the lane keeping assistance function as an autonomous and (IU02) Incorrectly used system.
HA-003	(OM03) Normal driving	(OS02) City Road	(EN06) Rain (slippery road)	(SD01) Low speed		(IU01) Correctly used	(OM03) Normal driving on a (OS02) City Road during (EN06) Rain (slippery road) with (SD01) Low speed and (IU01) Correctly used system.
HA-004	(OM03) Normal driving	(OS04) Highway	(EN01) Normal conditions	(SD02) High speed		(IU01) Correctly used	(OM03) Normal driving on a (OS04) Highway during (EN01) Normal conditions with (SD02) High speed and (IU01) Correctly used system.

Hazard Identification							
Function	**Deviation**	**Deviation Details**	**Hazardous Event (resulting effect)**	**Event Details**	**Hazardous Event Description**	**Exposure (of situation)**	**Rationale (for exposure)**
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 an oscillating torque with very high torque (above limit)	(EV00) Collision with other vehicle	The LDW function applies an oscillating torque with very high torque (above limit) with possible resulting effect of (EV00) Collision with other vehicle and injury to driver.	Driver is unable to maintain grip on the steering wheel.	(E3) Medium probability	High way driving in Rain (slippery road) is a fairly common event for a driver.
Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	(DV03) Function always activated	The LKA function is constantly active allowing some drivers to misinterpret this as a fully autonomous vehicle	(EV00) Collision with other vehicle	The LKA function is constantly active allowing some drivers to misinterpret this as a fully autonomous vehicle with possible resulting effect of (EV00) Collision with other vehicle and injury to driver.	Driver intentionally removes hands from steering wheel.	(E2) Low probability	Country road driving with the driver's hands removed from the steering wheel would not occur often.
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 an oscillating torque with very high torque (above limit)	(EV00) Collision with other vehicle	The LDW function applies an oscillating torque with very high torque (above limit) with possible resulting effect of (EV00) Collision with other vehicle and injury to driver.	Driver is unable to maintain grip on the steering wheel.	(E3) Medium probability	City driving in Rain (slippery road) is a fairly common event for a driver.
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 an oscillating torque with very high torque (above limit)	(EV00) Collision with other vehicle	The LDW function applies an oscillating torque with very high torque (above limit) with possible resulting effect of (EV00) Collision with other vehicle and injury to driver.	Driver is unable to maintain grip on the steering wheel.	(E4) High probability	High way driving in Normal conditions is a common event for a driver.

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) Life-threatening or fatal injuries	Highway driving is at high speed (> 40 KPH) and any collision in this speed zone has the highest severity level.	(C3) Difficult to control or uncontrollable	Violent steering wheel jerk would make it difficult to control the vehicle.	(S3) intersection with (C3) -> (E3) = ASIL C	Reduce maximum steering oscillating torque to prevent hazardous event : Driver is unable to maintain grip on the steering wheel.
(S3) Life-threatening or fatal injuries	Highway driving is at high speed (> 40 KPH) and any collision in this speed zone has the highest severity level.	(C3) Difficult to control or uncontrollable	The driver's hands are not on the steering wheel at high speed.	(S3) intersection with (C3) -> (E2) = ASIL B	Set time limit on function activation to prevent hazardous event : Driver intentionally removes hands from steering wheel.
(S1) Light and moderate injuries	City driving is at low speed and any collision in this speed zone has the lowest severity level.	(C3) Difficult to control or uncontrollable	Violent steering wheel jerk would make it difficult to control the vehicle.	(S1) intersection with (C3) -> (E3) = ASIL A	Reduce maximum steering oscillating torque to prevent hazardous event : Driver is unable to maintain grip on the steering wheel.
(S3) Life-threatening or fatal injuries	Highway driving is at high speed (> 40 KPH) and any collision in this speed zone has the highest severity level.	(C3) Difficult to control or uncontrollable	Violent steering wheel jerk would make it difficult to control the vehicle.	(S3) intersection with (C3) -> (E4) = ASIL D	Reduce maximum steering oscillating torque to prevent hazardous event : Driver is unable to maintain grip on the steering wheel.