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							Hazard Identification						Hazardous Event Classification						Determination of ASIL and Safety Goals	
	Operational Mode	Operational Scenario	Environmental Details	Situation Details	Other Details (optional)	Item Usage (function)	Situation Description	Function	Deviation	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)	Rationale (for controllability)	ASIL Determination	Safety Goal
HA-001	Normal driving	Highway	Rain	High speed		Correctly used	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	Actor effect is too much	The LDW function aplies 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	The driver is driving on a highway at high speed in a rain, this probably does happen sometimes, so we will label the exposure E3.	S3	Because the driver is traveling at high speed	C3	The malfunction was that the lane departure warning assistance was applying too high an oscillating torque and it affected the driver's ability to steer. Because driver was unable to steer, a vehicle accident would not be controllable.	ASIL C	The oscillating steering torque from the lane departure warning function shall be limited.
HA-002	Normal driving	Country Road	Normal conditions	High speed		Incorrectly used	Normal driving on country roads during normal conditions with high speed and incorrectly used system	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	FunctionI always activated	The LKA function applies a constant ON steering torque	Side collision with other traffic	Constant ON steering torque can affect driver's ability to steer as inteded. The driver could lose control of the vehicle and coolide with another vehicle or with road infrastructure	The KLA function applies a steering torque to the wheel that does not end after a certain limit	E2	The driver is on a country road and misuing the system. That combination probably does not happen often, so we will label the exposure E2.	S3	Because the driver is traveling at high speed	C3	The malfunction was that the lane keeping assistance was always on and had no time limit, so drivers could take both hands off the wheel. Because hands aren't on the wheel at high speeds, a vehicle accident would not be controllable.	ASIL B	The lane keeping assistance function shall be time limited and the additional steering torque shall end after a given time interval so that the driver cannot misuse the system for autonomous driving.
HA-003	Normal driving	Mountain pass	Normal conditions	High speed		Correctly used	Normal driving on a mountain pass during normal conditions with high speed and correctly used system	Lane Departure Warning (LDW) functional shall apply an oscillating steering torque to provide the driver with haptic feedback	Sensor sensitivity is too high	The LDW function applies an oscillating torque too frequent (above limit)	Collision with other vehicle	Frequent 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 frequent an oscillating torque to the steering wheel (above limit)	E2	The driver is on a mountain pass driving at high speed. This does not happen often, so we will label the exposure E2	S3	Because the driver is traveling at high speed	C3	The malfunction was that the lane departure warning assistance was applying too frequent an oscillating torque and because the vehicle is travelling at high speed it affected the driver's ability to steer. Because driver was unable to steer, a vehicle accident would not be controllable.	ASIL B	The frequency of oscillating steering torque from the lane departure warning function shall be limited.
HA-004	Normal driving	Off road	Fog	Low speed		Correctly used	Normal driving off road during fog conditions with low speed and correcty used system	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	Actor effect is too less	The LKA function applies a steering toruge with very low torque (below limit)	Vehicle comes off the road	Low steering torque can not keep the vehicle within the lane. The driver may not respond immediatey and the vehicle may comes off the road	The KLA function applies too less a steering torque to the wheel	E2	The driver is driving off road with low speed in a fog weather. This does not happen often, so we will lable the exposure E2.	S1	Because the driver is traveling at low speed	C2	The malfunction was that the lane keepig assistance was applying a too low torque. Because the vehicle was travelling at low speed, the driver may be able to respond and move the vehicle back to the ego lane. Also because the weather is foggy, it may add some delays to the driver's responsiveness. Such conditions are normally controllable.	QM	The torque applied by the lane keeping assistance functional shall be limited.