CE 45000: Transport Policy and Planning
Homework 2
Due: Thursday, September 27, 2018

1) Calculate safety benefits at present value associated with a countermeasure (roundabout) selected for a 4-leg Intersection over 10 years in service life. The following data was given:

Major / minor AADT: 23,553 /1,650
The Crash Modification Factor (CMF) for roundabout: 0.56 for total crashes
Service life: 10 years
Annual traffic growth: 1.5%
Discount rate: 4%
Crash summary: 70% fatal and injury

Table 1: Societal Crash Costs

Injury Severity	Estimated Cost
Fatal (K)	$4,008,900
Cost for crashes with a fatal and/or injury (K/A/B/C)	$158,200
Disabling Injury (A)	$216,000
Evident Injury (B)	$79,000
Possible Injury (C)	$44,900
PDO (O)	$7,400

$$N_{spfint} = exp[a + b \times In(AADT_{maj}) + c \times In(AADT_{min})]$$

Intersection Type/ Severity Level	a	b	c	Overdispersion Parameter (Fixed k)[a]
4ST Total	−10.008	0.848	0.448	0.494
4ST Fatal and injury	−11.554	0.888	0.525	0.742
4ST Fatal and injury[b]	−10.734	0.828	0.412	0.655
3ST Total	−12.526	1.204	0.236	0.460
3ST Fatal and injury	−12.664	1.107	0.272	0.569
3ST Fatal and injury[b]	−11.989	1.013	0.228	0.566

Answer the following questions?

1. Calculate the expected average crash frequency without roundabout every year.
2. Calculate the expected crash frequency with roundabout every year.
3. Covert the change in crashes saved to a monetary value every year.
4. Calculate the safety benefits in 10 years. (Answer: $17,200,791)