Overdiagnosis Simulation Questions

(1) What are the input parameters that you considered?

population = 100000 #Number of people in the population
afliction_rate = .2 #Percent of people that have the disease (20%)
screening_rate = .75 #Percent of people that are screened for the disease (75%)
untreated_death_rate = .4 #Percent of people that die without treatment (40%)
treated_death_rate = .1 #Percent of people that die with treatment (10%)
treatment_rate = .9 #Percent of people electing to have treatment (90%)

(2) What are the output parameters?

overdiagnosis_rate = .539 #Percent of the treated population that was overdiagnosed
treatment_efficacy = .752 #How effective the treatment is at reducing deaths =
1 - (treated_death_rate/**untreated_death_rate**)

(3) What relationships did you consider to exist between them? (i.e., the input - output parameters)

aflicted_population = population * afliction_rate

diagnosed_population = aflicted_population * screening_rate

untreated_deaths = aflicted_population * **untreated_death_rate**

treated_population = diagnosed_population * treatment_rate

unlethal_diagnosed_population = treated_population * (1-**untreated_death_rate**)

overdiagnosed_population = unlethal_diagnosed_population * treatment_rate

overdiagnosis_rate = overdiagnosed_population/treated_population

diagnosed_untreated_population = diagnosed_population * (1-treatment_rate)

diagnosed_untreated_deaths = diagnosed_untreated_population * **untreated_death_rate**

diagnosed_untreated_death_rate =
diagnosed_untreated_deaths/diagnosed_untreated_population

treatment_efficacy = 1 - (treated_death_rate/diagnosed_untreated_death_rate)

(4) What are your general assumptions?

untreated_death_rate = 0.4

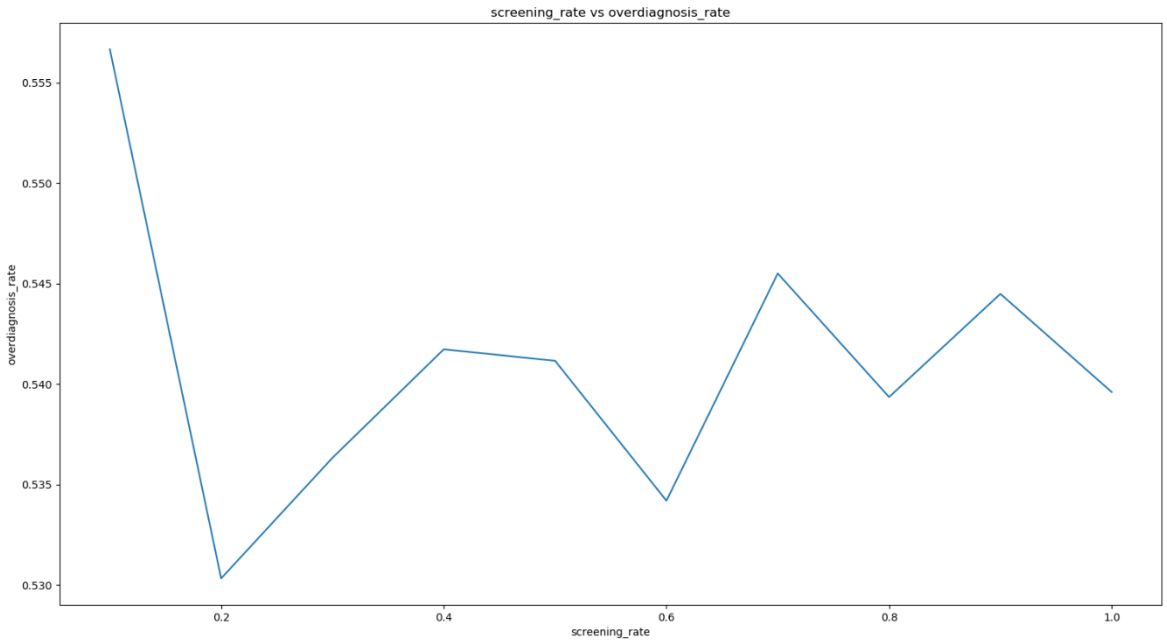
(5) What are the main findings? (you say something, but can you refine your answer more?).

1. screening_rate has no effect on results

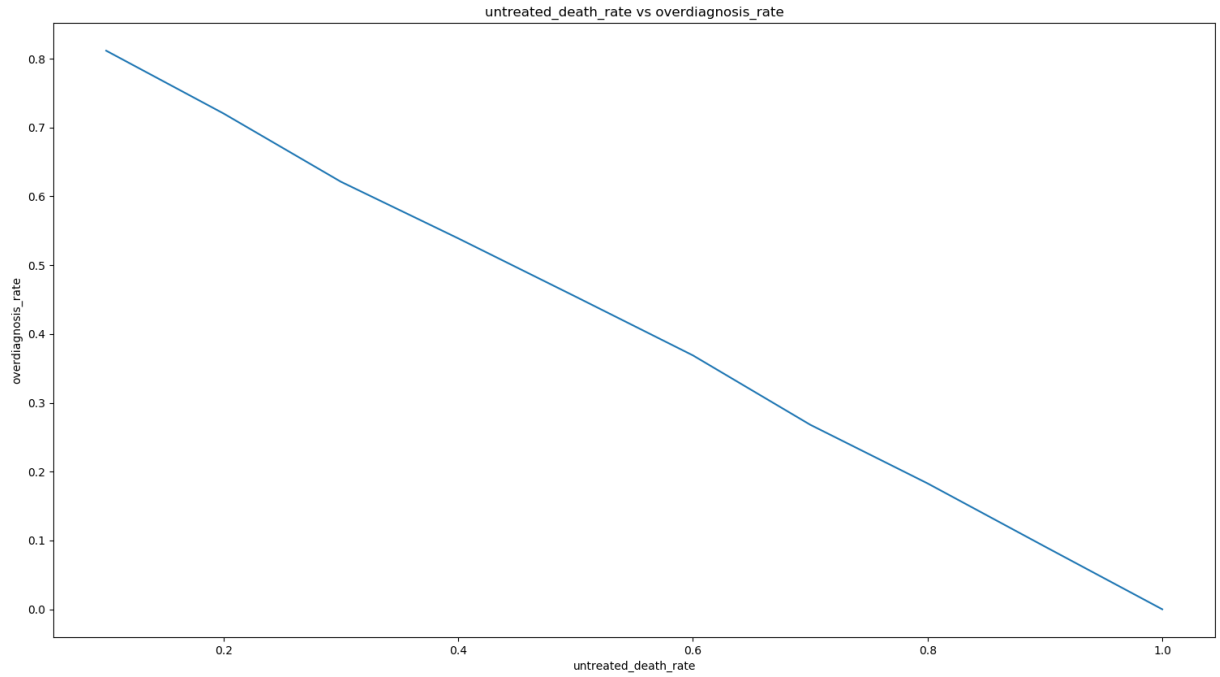
2. when untreated_death_rate increases, overdiagnosis rate decreases
when untreated_death_rate decreases, overdiagnosis rate increases

3. when treatment_rate increases, overdiagnosis rate increases
when treatment_rate decreases, overdiagnosis rate decreases

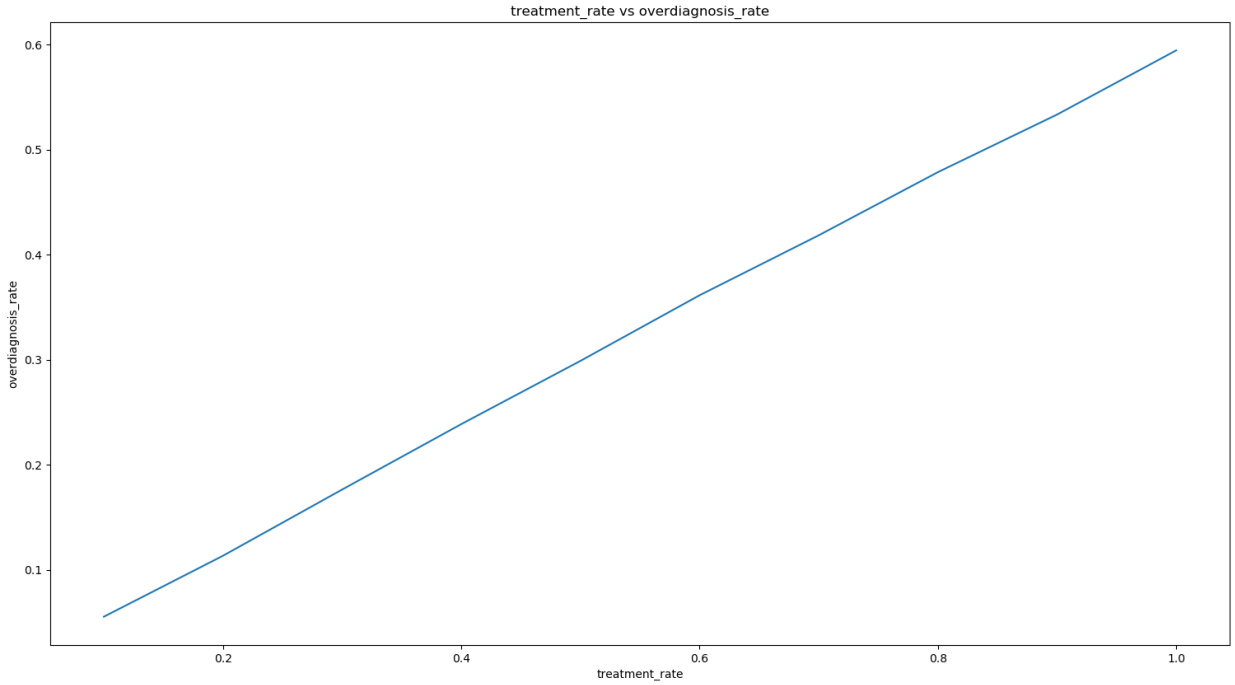
(6) Any plots you can share with me? As they say, "A drawing is worth 1,000 words" :-)



1. screening_rate vs overdiagnosis_rate: screening_rate has no effect on overdiagnosis rate, only small noise is present



2. untreated_death_rate vs overdiagnosis_rate



3. treatment_rate vs overdiagnosis_rate