Instructions: You need paper (lined if possible), a ruler, and a pen or a pencil to write this quiz. You may answer the questions in any order you like. You should start each question on a new page. You must write your answers; typed answers will not be accepted. When you are finished answering the questions, please order the pages so your answer to question 1 is first, then your answer to question 2, etc. Then, in a single email message, send an image of each page to me at jburbidg@uwaterloo.ca. Please put Econ 393, your name and your id number in the subject line of your email. The deadline for submitting your answers is 6:00 pm Tuesday July 14th, Toronto time. The marks allocated to each question are shown in brackets.

Questions 1, 2 and 3 are about the two-type car insurance model we analyzed last week.

1. (3 marks) Using a carefully drawn $w_gw_b$ diagram, prove that a pooling equilibrium cannot exist in this model.

2. (3 marks) What are the necessary conditions for an imperfect-information equilibrium in this model?

3. (3 marks) (True, false and explain) In the case where $w_0 = 100, L = 75, \pi^G = 2/3, \pi^B = 1/3, u(w) = w^{1/2}$ and half the drivers are good, there is no separating equilibrium.

4. (3 marks) Jean is a risk-averse, expected-utility maximizer who has $A$ dollars to invest. At the beginning of the period, she puts a fraction $1 - a$ of her money into a safe asset that pays a zero rate of return. And she invests fraction $a$ of her money into a risky asset that pays $r_1 > 0$ in the good state and $r_2 < 0$ in the bad state. The government levies a proportional tax, $0 < t < 1$, on her investment returns such that her net return is $(1 - t)r$ in either state. So in the good state her wealth at the end of the period would be

$$(1 - a)A + aA(1 + (1 - t)r_1) = A(1 + (1 - t)ar_1).$$

And her expected utility as a function of $a$ and $t$ could be written as

$$E(a, t) = \pi u(A(1 + (1 - t)ar_1)) + (1 - \pi)u(A(1 + (1 - t)ar_2)),$$

where $\pi$ is the probability of the good state and $u(w)$ is Jean’s Bernoulli utility of wealth function. Assume that when $t = 0$ Jean chooses $0 < a < 1$. Does increasing the tax rate raise or lower $a$? Defend your answer.