1. Policy instruments [50% of the exam, each question counts equally]

Suppose that polluter 1 obtains the profit $B_1(g_1) = v_1 g_1 - g_1^2$ from polluting g_1 units, while polluter 2 benefits $B_2(g_2) = v_2 g_2 - g_2^2$ from polluting g_2 units. The damage for the society is given by $g_1 + g_2$.

i) Let $v_1 = 10$ and $v_2 = 20$. Please draw the benefit and cost curves in a diagram with pollution on the horizontal axis and marginal benefits and marginal costs on the vertical axis, to illustrate the optimal pollution levels.

ii) Suppose firm 1 is not allowed to pollute, but firm 2 can pollute 10 units. Illustrate in a figure the efficiency gain that one can obtain if the two firms can freely negotiate how to split the 10 units that is possible to pollute.

iii) In which sense will you say that the Coase theorem predicts that the two firms will end up with an agreement on the efficient way of splitting the right to emit 10 units?

Suppose now that v_2 is not always 20, but instead it is 0 with probability 1/2, and $v_2 = 20$ with probability 1/2. The firms know whether $v_2 = 0$ or $v_2 = 20$.

iv) Can you illustrate in a figure the benefits from allowing the firms to trade the pollution permits, compared to the case in which the regulator dictates how much each firm should pollute?

v) Please discuss whether a Pigou tax would be better for society.

2. Climate Change [50% of the exam, each question counts equally]

You are a policy maker and your economic adviser asks you to price every ton of CO_2 emitted at NOK 400.

i) Explain why we should price CO_2 emissions. In your answer, also discuss how CO_2 emissions affect human welfare.

ii) Discuss what questions you might ask the scientist regarding the employed discount rate and why and how that matters.

iii) Raise one more question you consider relevant to discuss with your economic consultant to better understand the number he/she suggests. Discuss why and how the model component you ask about is relevant.

iv) Discuss two alternative ways how you can implement a pricing of CO_2 emissions. What are the advantages or disadvantages of either implementation?