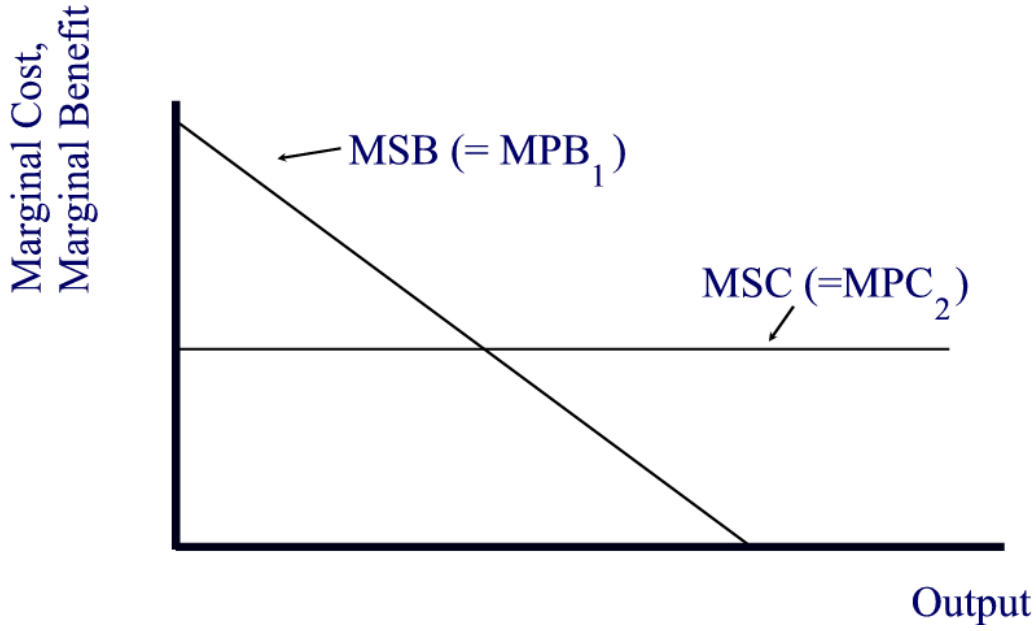
ANU School of Economics
Law and Economics – Honours and Postgraduate
Semester 2, 2003
Mid Semester Exam

Name:_____ Student Number:_____

1. Consider an economy with two firms, labelled 1 and 2. Firm 1 produces output, labelled x, and the marginal private benefits of its output are labelled MPB_1 in the diagram below. The marginal social benefits of firm 1's activity – labelled MSB – are equal to firm 1's marginal private benefits. Firm 1's output imposes a negative externality on firm 2. The marginal private costs to firm 2 are constant and are labelled MPC_2 in the diagram below. The marginal social costs of firm 1's activity – labelled MSC – are equal to firm 2's marginal private costs.



(a) What is the socially efficient level of output? Explain. Label this level of output x^* on the diagram. (10 marks)

Now consider the following three legal regimes:

- **Regime 1:** A no liability rule – firm 1 has the legal right to produce as much output as it wishes.
- **Regime 2:** Firm 2 has the legal right to stop firm 1 producing output.
- **Regime 3:** A strict liability rule – firm 1 has the legal right to produce as much output as it wishes, but is strictly liable for any damages that it causes to firm 2.

In parts (b)-(e), assume that the firms cannot bargain with each other.

(b) Suppose that the legal regime is regime 1. How much would firm 1 choose to produce? Label this level of output x_1 on the diagram. Does regime 1 produce efficient outcomes? Explain. (10 marks)

(c) Suppose that the legal regime is regime 2. How much output would firm 2 want firm 1 to produce? Label this level of output x_2 on the diagram. Does regime 2 produce efficient outcomes? Explain. (10 marks)

(d) Suppose that the legal regime is regime 3. How much would firm 1 choose to produce? Label this level of output x_{SL} on the diagram. Does regime 3 produce efficient outcomes? Explain. (10 marks)

(e) In the absence of bargaining, which legal regime does firm 1 prefer? Which legal regime does firm 2 prefer?

In parts (f) - (j) below, assume firms can bargain with each other over the level of output that is produced.

(f) Under regime 1, how output would firm 1 produce? How much would firm 2 be willing to pay firm 1 to reduce its production? Does regime 1 produce efficient outcomes? Explain. (10 marks)

(g) Under regime 2, how output would firm 1 produce? How much would firm 1 be willing to pay firm 2 to allow it to increase its production? Does regime 2 produce efficient outcomes? Explain. (10 marks)

(h) Under regime 3, how output would firm 1 produce? Would any bargaining take place? Does regime 3 produce efficient outcomes? Explain. (10 marks)

(i) With bargaining, do the final output levels in parts (f)-(h) differ? Explain. (10 marks)

(j) When bargaining is permitted, which legal regime does firm 1 prefer? Which legal regime does firm 2 prefer? (10 marks)

2. Now consider the situation in question 1 again, but suppose that there is a **negligence rule**, where the court sets a level of production z. If firm 1 produces $x \leq z$, it is not liable for any damages. If it produces $x > z$, it must fully compensate firm 2 for any damages that it causes. There are three possibilities for z:

- **Regime 4:** A negligence rule with $z = x^*$
- **Regime 5:** A negligence rule with $z > x^*$
- **Regime 6:** A negligence rule with $z < x^*$

In parts (a)-(b), assume that the firms cannot bargain with each other.
(a) Which negligence rule (if any) is efficient? Explain. (10 marks)

(b) In the absence of bargaining, which negligence rule does firm 1 prefer? Which negligence rule does firm 2 prefer? Explain. (10 marks)

In parts (c) - (d) below, assume firms can bargain with each other over the level of output that is produced.

(c) When bargaining is permitted, which negligence rule (if any) is efficient? Would bargaining take place under any of them? Explain. (10 marks)

(d) When bargaining is permitted, which negligence rule does firm 1 prefer? Which negligence rule does firm 2 prefer? (10 marks)

(e) Overall, when bargaining is permitted, which of the legal regimes 1-6 in questions 1 and 2 does firm 1 prefer? Which of the legal regimes 1-6 does firm 2 prefer? (10 marks)

3. Now suppose that the regulator does not know the exact shape of the marginal benefit curve. Suppose that firm 1's actual marginal benefit curve is:

$$MPB_1(x) = B_0 + B_1 x + u$$

where $B_1 < 0$, and u is a random variable with mean zero and variance $\sigma_u^2 > 0$. The regulator knows the values B_0 and B_1, but cannot observe the realization of u. Suppose, however, that the regulator *does* know firm 2's marginal costs, MPC_2, which are constant.

Let $\overline{x}$ be the point where *expected* marginal social benefits equal marginal social costs, and consider the following four policy options that are available to the regulator:

- **Quantity Regulation:** Force firm 1 to always produce at $x = \overline{x}$.
- **Tax Regulation:** Set a tax equal to $t = MPC_2$ on each unit of the good that firm 1 produces.
- **Strict Liability:** Make firm 1 strictly liable for any damage that it causes to firm 2.
- **Negligence Rule:** The regulator sets a level of production z. If firm 1 produces $x \leq z$, it is not liable for any damages. If it produces $x > z$, it must fully compensate firm 2 for any damages that it causes. (You may assume here that the regulator sets $z = \overline{x}$)

What are the expected deadweight losses under each legal regime? If the regulator wishes to minimize expected deadweight losses, which policy option should he choose? How would your answer change (if at all) if the firms were permitted to bargain with each other? (50 marks)