Problem 1 (Exercise 9.2). There are two groups of individuals: Group L with productivity 2 and Group H with productivity 3 (both independent of education). Group H constitutes $1/3$ of the population. Workers of both types are able to buy education, at a cost. The amount of education y is a continuous variable and is fully verifiable. Type L individuals face a higher cost of acquiring education: $C_L(y) = y$ and $C_H(y) = y/2$.

Employers believe that anybody with a level of education less than y^* has a productivity of 2 (and thus is offered a wage of 2) while anybody with a level of education greater than or equal to y^* has a productivity of 3 (and thus is offered a wage of 3).

(a) What values of y^* give rise to a separating signaling equilibrium?

(b) If the government forced everybody to choose $y = 0$ and employers to pay everybody a wage equal to average productivity, would there be a Pareto improvement?

Problem 2 (Exercise 9.5). Suppose employers offer the wage schedule shown below.

Education	$y = 6$	$y = 12$	$y = 16$	$y = 18$	$y = 21$
Income	10,000	15,000	20,000	25,000	30,000

H-types have productivity π_H and L-types have productivity π_L (both independent of education). The monetary cost of acquiring education for each type is as follows:

$$C_H(y) = \begin{cases} 0 & \text{if } y \leq 6, \\ 900(y-6) & \text{if } y > 6, \end{cases} \qquad C_L(y) = \begin{cases} 0 & \text{if } y \leq 6, \\ 1400(y-6) & \text{if } y > 6. \end{cases}$$

(a) For what values of π_H and π_L is there a separating signaling equilibrium?

(b) Assume the values of π_H and π_L from part (a). Suppose education beyond $y = 6$ is abolished and everybody is hired at a wage equal to average productivity. What proportion of H-types make this scenario Pareto superior to that of part (a)?

Problem 3. Bob's initial wealth is \$8,000 and he faces a potential loss of \$3,800. The probability of loss is 25% if he does not exert effort and 10% if he does exert effort. His von Neumann-Morgenstern utility-of-money function is

$$U(\$m) = \begin{cases} 100\ln(m) & \text{if he does not exert effort,} \\ 100\ln(m) - 7 & \text{if he exerts effort.} \end{cases}$$

(a) What is Bob's expected utility if he decides not to buy insurance?

(b) Suppose Bob is offered full insurance with premium \$1200. Will he purchase it?

(c) Suppose Bob is offered partial insurance with premium \$100 and deductible \$3000. What is his expected utility if he purchases the contract. Will he purchase it?

(d) What is expected profit from a contract with premium \$100 and deductible \$3000?