Health Economics, Exam June 2011
Hints for solution

Problem 1

1.1. Since there are no obvious types of market failure involved in the case concerned (such as the Samaritan principle, public goods aspects, service delivery subject to increasing returns to scale), the setting of prices on the specific services of hospitals and practitioners mentioned may be done in a way which as good as possible covers the costs connected with the specific services. For hospital treatments one might use the DRG prices (a brief explanation desirable). For payment of practitioners it might be mentioned that most established payment systems include capitation (fixed payment per patient connected to the doctor), so that treatment rates are rather low as compared to full cost.

1.2. There are two main types of problems connected with the insurance scheme, namely (1) moral hazard, connected with the possible lack of protection of the insured and possible over-use of the insurance once the accidents have happened and (2) adverse selection, connected with the different risks of getting injured by different individuals. The general response to such problems is the introduction of a copayment by the insured, in the case of adverse selection a differentiated deductible.

Problem 2

2.1. Here there should be a description in broad terms (not necessarily a derivation) of the fundamental equation of the Grossman model, stating that the marginal efficiency of investment in health should match the interest rate plus depreciation. The discussion could be followed up by a figure showing how the marginal efficiency of health investment depends on the stock of health capital, showing the equilibrium and the response to changing parameter as e.g. the interest rate.

2.2. When translated to the language of the Grossman model, the proposal amounts to a premium paid to those achieving a certain level of health capital, so that the marginal efficiency of health investment increases on the segment above this level. The outdoor activities might be useful considered

as investment in health, but their cost is not reimbursed, so the effects comes mainly from the payoff of invested health capital.

Problem 3.

3.1. As is always the case, the choices are in accordance with some principles of fairness or efficient and in conflict with others. Below follows some key examples.

The Case A choice is, for example, in conflict with the "Equal Value of Life" (EVL) principle (understood as equal entitlements across individuals to additional life year). Since patients A1 and A2 are at the same age, the Case A choice it is conflict with even the age-dependent version of that principle. In particular, it rules out that the social preferences of the decision maker take only aggregate life years into account.

The Case B choice indicates, for example, that when both patients have common health state (here perfect health) a gain in life years for one patient is *not* socially equally good as a gain in life years for the other patient *in the same proportion*. Hence, it indicates that the relative lifetime comparisons (RLC) axiom does not hold for the case of perfect health. (Strictly speaking the axiom could still hold with reference to some other common health state - recall that the RLC axiom only requires that the relative lifetime comparisons property holds with respect to *some* common health state).

None of the choices are in conflict with the NAD axiom (with respect to perfect health), i.e. the principle that for any two patients with perfect health, a gain in life years to the one patient is socially equally good as the same gain to the other, regardless of their current age. In particular, the Case C choice is perfectly in accordance with NAD as the choice precisely is "indifferent" in the case where an equal amount of life years is at stake for two individuals with common health state (perfect health).

3.2. We look for a population health evaluation function (PHEF) (= "health related social welfare function" (HRSWF)) evaluating health distributions $(a,t) = ((a_1,t_1),...,(a_n,t_n))$ which is in accordance with the 3 choices discussed above. Since we have already observed that all three choices are in accordance with NAD (with respect to perfect health) it is natural to suggest the "QALY utilitarian" population health evaluation function

$$U = \sum q_i(a_i,t_i),$$

where $q_i(a_i,t_i) = h_i(a_i)t_i$. In a deterministic framework, $h_i(\cdot)$ could be assessed by the TTO method. With reference instead to an expected utility

framework, $h_i(\cdot)$ could be assessed by TTO (time trade-off) or SG (standard gamble) techniques.

Discussion of the model could include an outline of the "veil of ignorance" argument (cf. e.g. Singer et al. and others) in favour of QALY utilitarianism, and of the "double jeopardy" argument (cf. e.g. Harris and others) as a case against QALY utilitarianism. It could also include a further discussion of the Equal Value of Life (EVL) principle and/or other axioms like RLC or LTA that it violates.

Some possible alternatives to the QALY utilitarian model are given below.

The PHEF

$$U = \sum t_i,$$

which simply measures total life years lived is of course in accordance with the Equal Value of Life principle (and actually implied by it under weak regularity assumptions). But, as indicated above, it violates the choice in case A. The multiplicative (Cobb-Douglas) PHEF

$$U = q_1(a_1, t_1)q_2(a_2, t_2) \cdots q_n(a_n, t_n),$$

where $q_i(a_i, t_i) = h_i(a_i)t_i$, embodies a (rather strong) sense of social preference for equality in distribution of QALYs. The Cobb-Douglas PHEF however violates the choices in Case B.

The Bergson family of PHEFs:

$$U = \sum (q_i(a_i, t_i))^p$$

with $p > 0$, and $q_i(a_i, t_i) = h_i(a_i)t_i$, is a nice family of PHEF that encompasses the QALY utilitarian as a special case ($p = 1$).(If we restrict attention to strictly positive life years, it also encompasses the Cobb-Douglas PHEF as a limit case). Hence it also encompasses a social preference for equality in the distribution of QALYs.