

Problem Set 5: Sample Problems to Accompany Chapters 9
Economics 152
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1) You are trying to set up the salary scale at your firm where you wish to hold a tournament. All individuals at the firm produce the same thing, coal, and two jobs “diggers” and “chiefs”, are merely set up for reasons of motivation. It is very difficult to count or weigh coal, but when stacked up, it is easy to see which worker’s output fills a larger truck. Coal sells for \$1.00 per pound and is produced as follows:

$$q = m + e$$

where q is the number of pounds of coal, m is effort, and e is a luck factor, reflecting the hardness of the shaft that was mined and other factors over which the worker has no control.

A worker’s cost of effort is $C(m) = (1/6)m^2$. There are two workers, j and k . Each worker experiences luck, e_j and e_k , respectively. $x = e_k - e_j$ takes on values between -1 and $+1$ with a uniform probability distribution. (All this means is that $g(x)$, the PDF of $e_k - e_j$, is equal to $1/2$ at all points between -1 and 1 . In particular, it means $g(0)=1/2$.)

Suppose you announce that at the end of the job the worker with the larger pile of coal will be paid a chief’s wage of w_1 and the losing worker will be paid a digger’s wage, w_2 .

- a) If the firm chooses the profit-maximizing w_1 and w_2 , how much effort m will each worker choose?
- b) What w_1 and w_2 will the firm choose to get the workers to put forth this amount of effort?
- c) What is the firm’s profit at this level of output and this wage schedule?
- d) Suppose instead the firm chose $w_1=8$ and $w_2=4$. How much effort would each worker choose?
- e) What is the new profit level?