Worksheet #18 (2017/12/20)

Name: ID:

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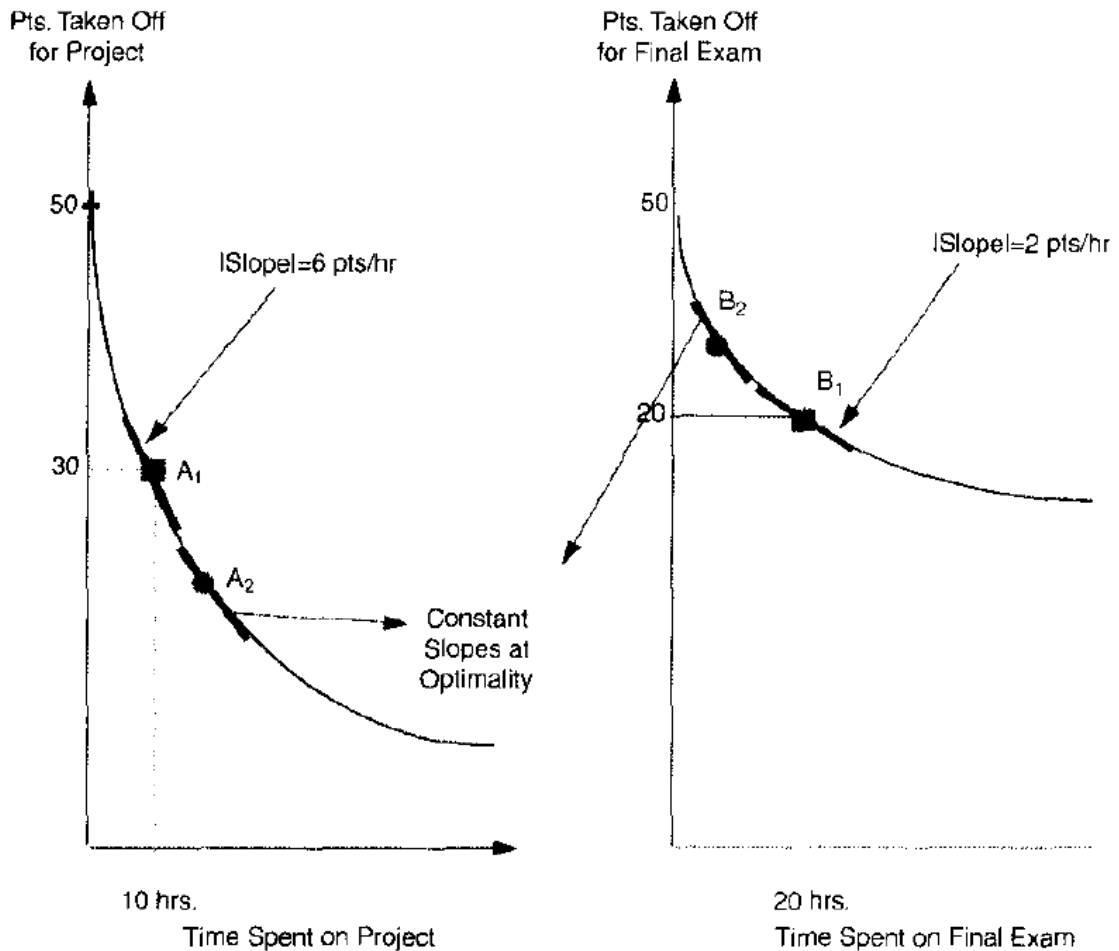
Note: We will collect this worksheet at the end of the lecture.

- We plan to cover Sections 6.2–6.2.2 today.

- We use Chapter 06 slides 8–12.

- This is corresponding to the textbook pages 259–264.

1) (1%) Prove that: if f is coercive on closed, unbounded set $\mathbf{S} \subseteq \mathbb{R}^m$, then f has global minimum on $\mathbf{S}$.

2) (0.5%) Prove that: if f is continuous on a set $\mathbf{S} \subseteq \mathbb{R}^n$ and has a nonempty sublevel set that is closed and bounded, then f has a global minimum on $\mathbf{S}$.

3) (0.5%) Bear is a poor college student who is taking the Scientific Computing course. The instructor (for unknown reasons) sets the programming project deadline to be at the same time as the final exam. Bear found this out 30 hours before the final exam, and now he has to split the time between these two activities: project and exam. Suppose the weights of these two activities are the same. If Bear knows the cost/performance ratios (pts per hr, more precisely) of spending time on programing and preparing the final exam, and in fact he plots the curves of spent time versus lost points in the below figure. What is the optimal way to split the 30 hrs between these two activities?

Pts. Taken Off for Project — |Slope|=6 pts/hr — Constant Slopes at Optimality — 10 hrs. Time Spent on Project

Pts. Taken Off for Final Exam — |Slope|=2 pts/hr — 20 hrs. Time Spent on Final Exam

Problem: Max. total score given a 30 hr. budget.

Solution: A1, B1 not optimal: by diverting 1 hr. from final exam to project, you can gain 4 pts!