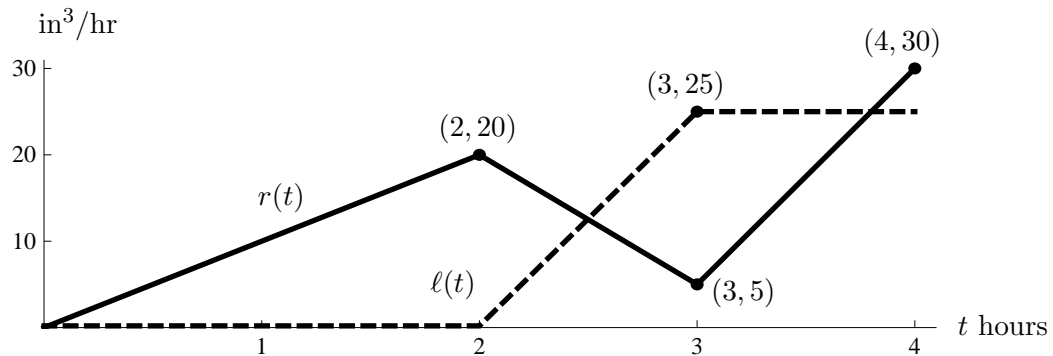


6. [12 points] A large bucket is left outside during a storm, and the bucket begins to fill with rain. The rain starts at midnight, at which point the bucket is empty. At 2am, the bucket springs a leak and some water begins to drip out of it. The function $r(t)$ is the rate at which rain is falling into the bucket t hours after midnight, measured in in^3/hr , while the function $\ell(t)$ is the rate at which water is leaking out of the bucket t hours after midnight, measured in in^3/hr . These functions are graphed below.



Be sure to **include units** in your answers to the following questions. No explanation is necessary, but partial credit may be given for correct work. Assume the bucket is big enough that it never overflows during the storm.

- [3 points] How much water was in the bucket at 3am?
- [2 points] At what time was the amount of water in the bucket greatest?
- [3 points] What is the largest amount of water that was in the bucket between midnight and 4am?
- [2 points] At what time was the amount of water in the bucket increasing fastest?
- [2 points] Write an integral expressing the average rate at which rain fell into the bucket over the period from midnight to 4am. You do not need to evaluate your integral.