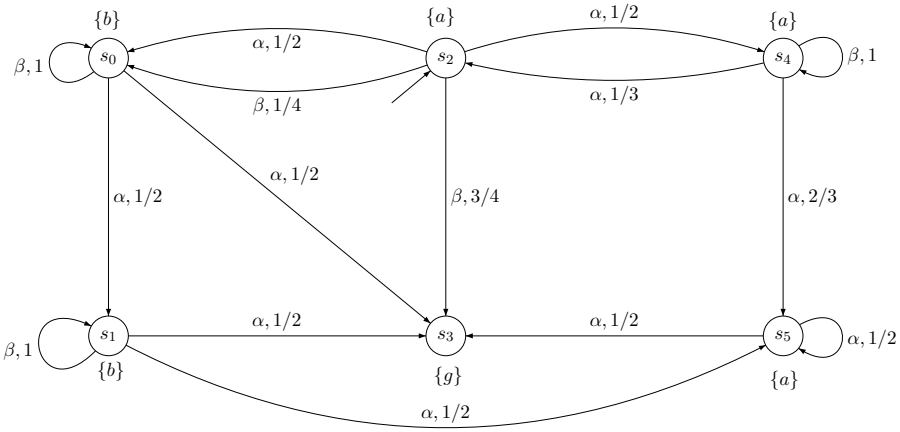
## Exercise 1 (PCTL Model Checking): (5 points)




Consider the MDP $M$ as shown above. Find out the satisfaction sets of the following properties or list the probabilities corresponding to a maximizing scheduler for all states, give the used policies, and describe their properties:

1. $\mathbb{P}_{\geq 0.5}(\bigcirc a)$
2. $\mathbb{P}_{\geq .6}(\bigcirc b)$
3. $\mathbb{P}_{\leq .3}(\Diamond g)$
4. $\Pr^M(s \models (\Box \Diamond a))$
5. $\Pr^M(s \models (\Box \Diamond a \wedge \neg \Box \Diamond b))$

## Exercise 2 (Exponential Distribution): (3 points)

Show that the maximum of two exponential distributions is not an exponential distribution.

## Exercise 3 (CTMC Modelling): (2 points)

We consider a server system consisting of two servers and a queue of capacity one. Jobs arrive with a rate $\lambda$, and are scheduled to any available server. If no server is available, they're put in the queue. The servers handle the jobs with rate $\mu$. If done, a job from the queue is taken, if there is one. Otherwise, the server is idle.
Model the system as a CTMC.