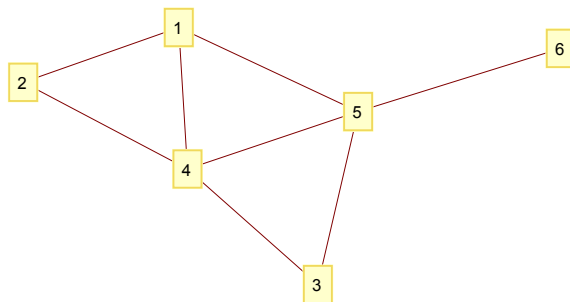


Math 339SP — Matrix powers



Let's go back to the random walk on a graph from last time using the same graph, which is shown above.

Problem 1. Express the following probabilities in terms powers of the transition matrix P and its entries. Then use R to compute their values. The `matrix_powers.Rmd` file on the class web page gives a quick introduction to this.

- $P(X_7 = 5 \mid X_4 = 4)$
- $P(X_{50} = 5 \mid X_{40} = 2)$
- $P(X_{12} = 3 \mid X_4 = 1)$

Problem 2. Let's go back to the random walk on a graph using the graph shown above. Suppose the random walker starts at a random vertex according to the probability vector $\alpha = (0.1, 0.2, 0.05, 0.35, 0.2, 0.1)$. By this we mean $P(X_0 = i) = \alpha_i$ for each $i = 1, \dots, 6$. Express the following probabilities in terms of α and P . Then use R to compute their values. The command `alpha = c(0.1, 0.2, 0.05, 0.35, 0.2, 0.1)` will let you make a row vector.

- $P(X_7 = 5)$
- $P(X_{25} = 3)$
- $P(X_{17} = 3 \mid X_9 = 2)$
- Challenge questions:
 - $P(X_{50} = 5, X_{40} = 2)$
 - $P(X_{12} = 3, X_4 = 1, X_2 = 3)$