LARSON—MATH 353–HOMEWORK WORKSHEET h09
Optimal Stopping.

1. Log in to your Sage Cloud account.

   (a) Start the Chrome browser.

   (b) Go to `http://cloud.sagemath.com` and sign in.

   (c) You should see an existing Project for our class. Click on that.

   (d) Click "New", call it **h09**, then click "Sage Worksheet".

   Optimal Stopping

   A coin is flipped n times. Let s_n be the number of Heads that come up. At any point you can stop and collect $\frac{s_n}{n}$ dollars (so the max would be \$1). If you get a Heads on the first flip you should stop. If you get Tails on the first flip, you should flip again.

   We will carefully investigate the case where you get Tails on the first flip followed by Heads and Heads. If you stop now you'll collect $\frac{2}{3}$ dollars.

   Do some experimental investigations to answer the following questions.

2. If you keep playing what is the maximum fraction $\frac{s_n}{n}$ you would *expect* if you keep playing? (Would you expect to do better than $\frac{2}{3}$ dollars?)

   If so (that is, if we should keep playing in order to improve our expected outcome), what strategy should we use going forward?

   (a) Investigate the case where the 4th flip is Heads. Discuss.

   (b) Investigate the case where the 4th flip is Tails. Discuss.

   (c) Investigate the case where the 4th flip is Tails and the 5th flip is Heads. Discuss.

   (d) Investigate the case where the 4th flip is Tails and the 5th flip is Tails. Discuss.

   (e) Investigate the case where the 4th flip is Tails, 5th flip is Heads, and the 6th flip is Heads. Discuss.

   (f) From these experimental results, can you say anything general about what to do when your first three flips are: Tails, Heads, Heads, in order to maximize your expected outcome?

   Getting your homework recorded

   When you are done...

   (a) Click the "Make pdf" (Adobe symbol) icon and make a pdf of this worksheet. (If Cocalc hangs, click the printer icon, then "Open", then print or make a pdf using your browser).

   (b) Send me an email with an informative header like "Math 353—h09 worksheet attached" (so that it will be properly recorded).

   (c) Remember to attach your homework worksheet!