

# hw2

May 29, 2020

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[1]: import numpy as np
      from scipy import stats
      %matplotlib widget
      from matplotlib import pyplot as plt
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[7]: if __name__ == "__main__":
      number_of_trials = [0, 2, 10, 20, 50, 10000]

      data = stats.bernoulli.rvs(0.5, size=number_of_trials[-1])

      x = np.linspace(0,1,100)

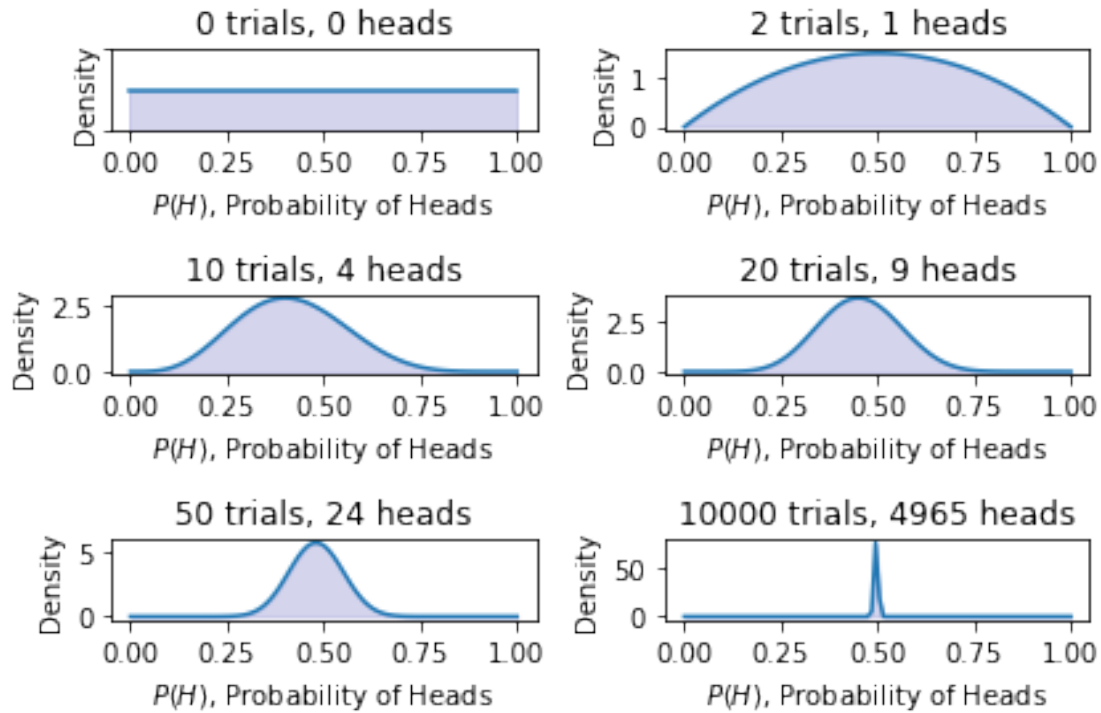
      for i, N in enumerate(number_of_trials):
          heads = data[:N].sum()

          ax = plt.subplot(len(number_of_trials) / 2, 2, i + 1)
          ax.set_title("%s trials, %s heads" % (N, heads))

          plt.xlabel("$P(H)$, Probability of Heads")
          plt.ylabel("Density")
          if i == 0:
              plt.ylim([0.0, 2.0])
              plt.setp(ax.get_yticklabels(), visible=False)

          y = stats.beta.pdf(x, 1 + heads, 1 + N - heads)
          plt.plot(x, y, label="observe %d tosses,\n %d heads" % (N, heads))
          plt.fill_between(x, 0, y, color="#aaaadd", alpha=0.5)

      plt.tight_layout()
      plt.show()
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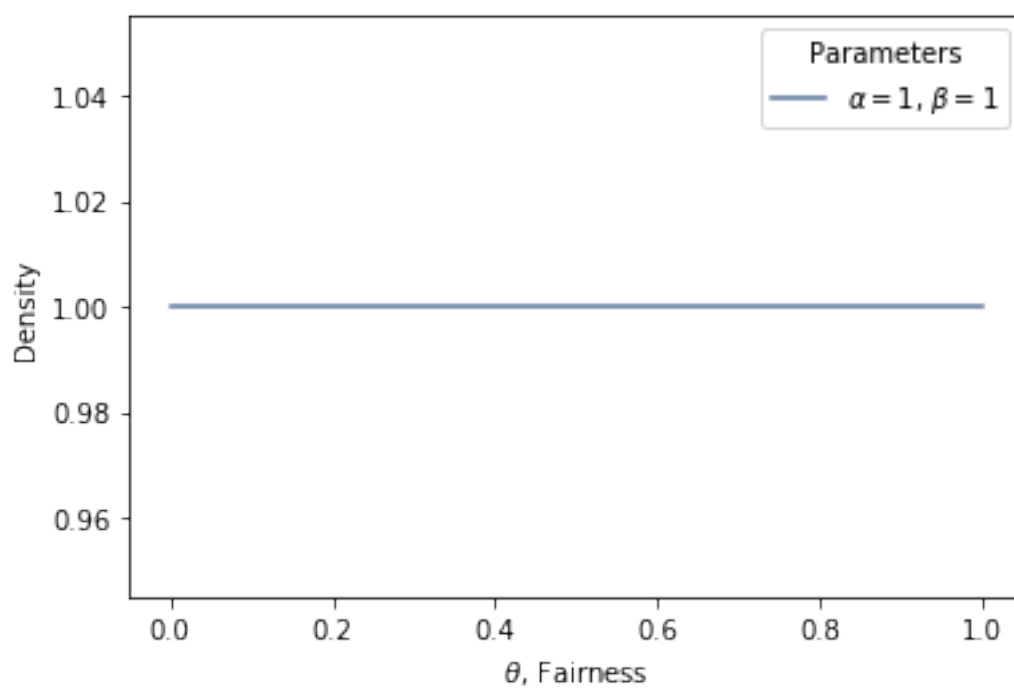
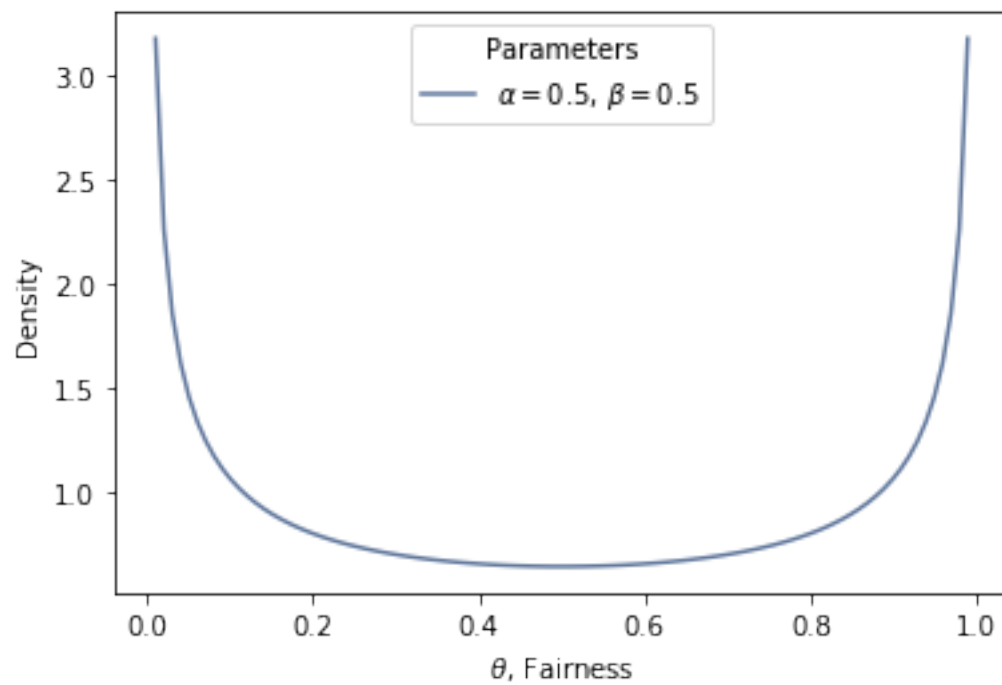


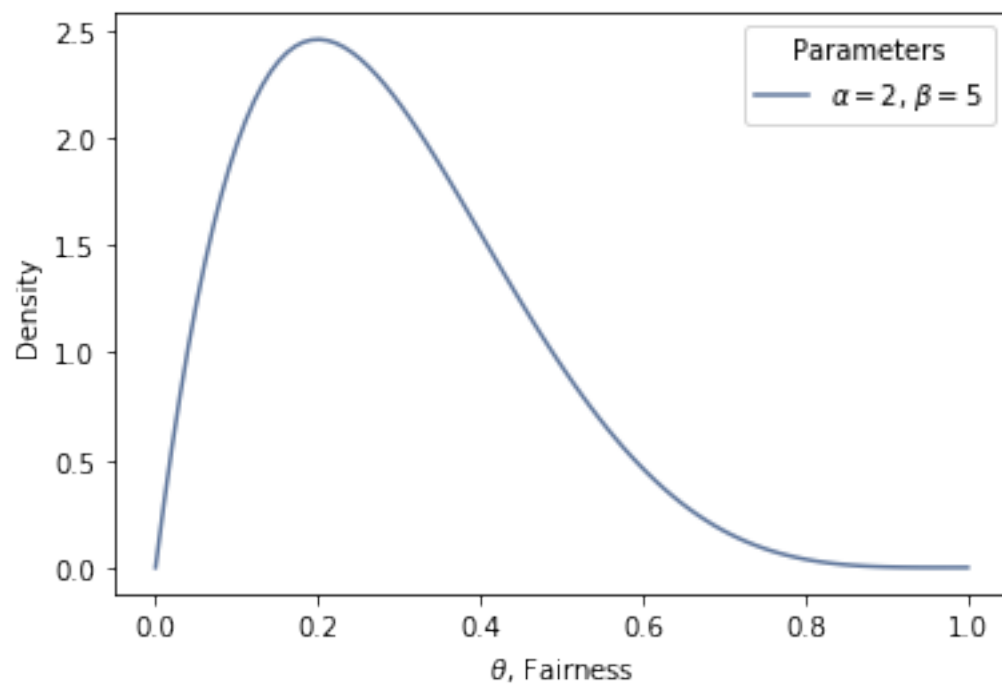
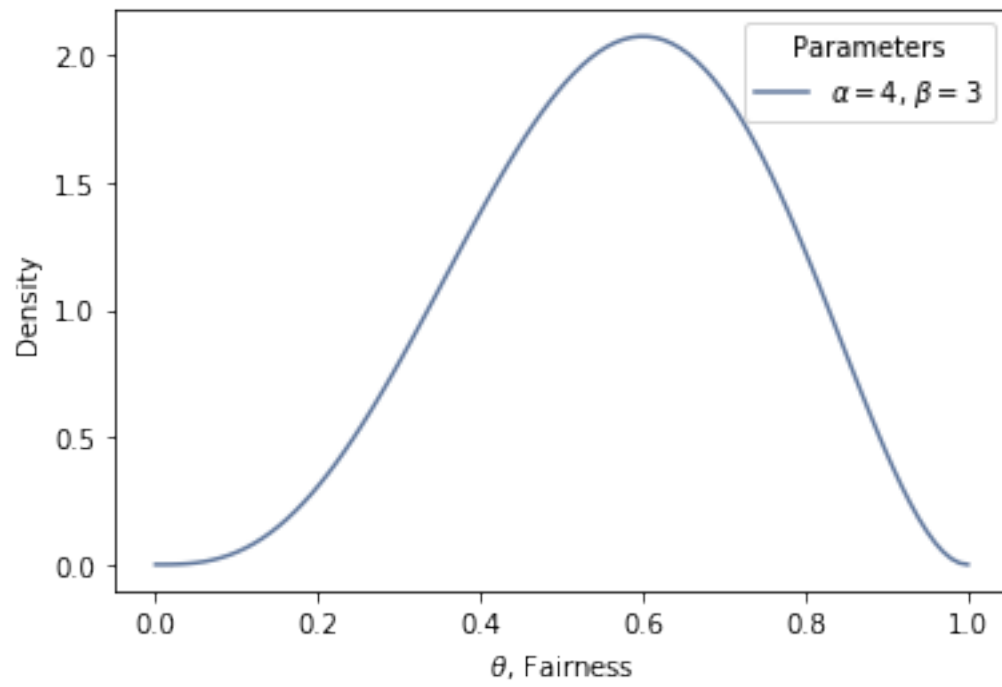
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[14]: import seaborn as sns
from scipy.stats import beta

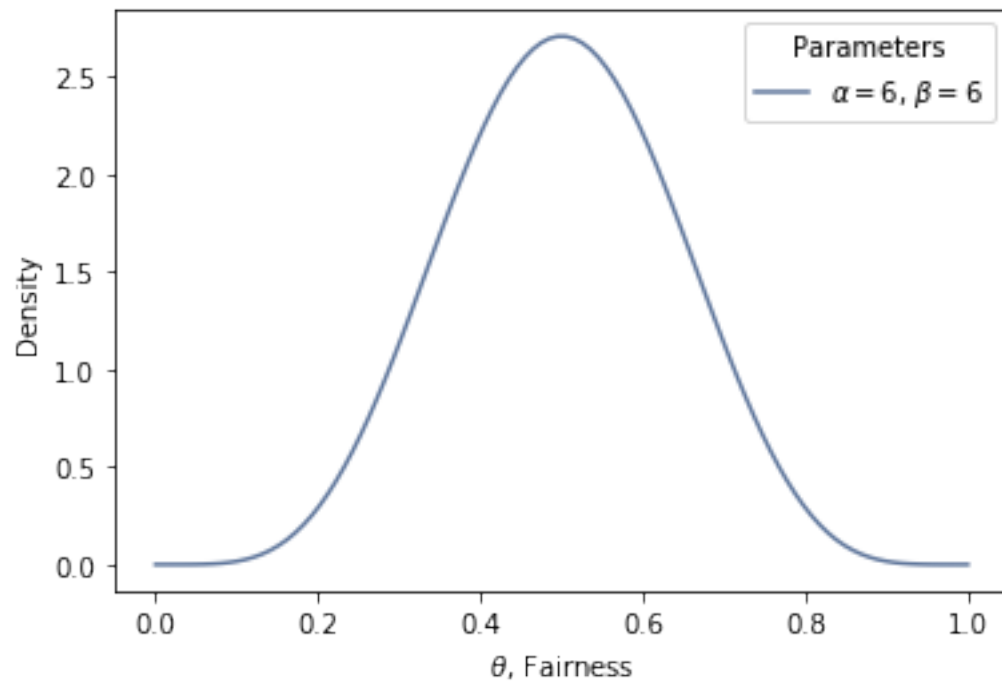
if __name__ == "__main__":
    sns.set_palette("deep", desat=.6)
    sns.set_context(rc={"figure.figsize": (8, 4)})

    x = np.linspace(0,1,100)
    params = [(0.5,0.5), (1,1), (4,3), (2,5), (6,6)]

    for p in params:
        y = beta.pdf(x,p[0], p[1])
        plt.plot(x, y, label="$\\alpha=%s$, $\\beta=%s$" % p)
        plt.xlabel("$\\theta$, Fairness")
        plt.ylabel("Density")
        plt.legend(title="Parameters")
        plt.show()
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