

## MATH 456, HOMEWORK 2

DUE SEPTEMBER 18, 2015

**Exercise 2.36.** In Example 2.2, show that  $0 \leq H_1 \leq 1$ .

**Exercise 2.37.** Prove the identities (2.17), (2.18), (2.26), (2.27), and (2.28) in Section 2.2.

**Exercise 2.43.** Suppose IBM pays a dividend  $D$  on their shares  $S$  at time  $\tau$ . Show that  $S(\tau+) = S(\tau-) - D$ .

**Exercise 2.44.** Let  $C_i$  for  $i = 1, 2, 3$  be European call options all expiring at  $T$  with strike prices  $K_i$  for  $i = 1, 2, 3$ , all written on the same stock  $S$ . The **butterfly spread** is the combination  $C_1 - 2C_2 + C_3$  with  $K_2 = \frac{1}{2}(K_1 + K_3)$ . Graph  $C(T)$  against  $S(T)$ . Show that  $C_2(0) < \frac{1}{2}(C_1(0) + C_3(0))$ . Discuss which assumptions you make.

**Exercise 2.45.** With the choices  $S(0) = \$10.50$ ,  $K = \$10.00$ ,  $C(0) = \$3.00$ ,  $P(0) = \$1.00$ , and  $R = 1.0043$ , show that the call-put parity formula is violated. Show how to create an arbitrage opportunity of at least \$1000.