Combinatorial Convexity

Errata and remarks

p. 7, in Theorem 1.10 $|U_i| = m \geq \beta^{1/\varepsilon^2} n$ is the right condition. Point (ii) should read "For every choice of $W_i \subset U_i$ with $|W_i| \geq \varepsilon m$ for all $i \in [k]$, the subhypergraph on $W_1, \dots, W_k$ contains at least one edge."

p. 7, in Exercise 1.9 should say ".. many copies of $K_{1,d}$ and $K_{d,d}$."

p. 11, line 7 should say ".. that is, $b = \sum_1^n \beta_i a_i$ satisfying $1 = \sum_1^n \beta_i$."

p. 15, in Exercise 3.1 should read ".. the points in A have a unique affine dependence (up to a scalar multiplier),"

p. 19, in Exercise 4.4 f is a map from the $d-1$ skeleton of Δ^{2d} to $\mathbb{R}^{2d-2}$ (and not to $\mathbb{R}^d$).

p. 25, Exercise 5.3 should say $n = (r-1)d + 1$. Further, unions should be there instead of intersections. Precisely, "Show that there are disjoint sets $I_1, \dots, I_r \subset [n]$ such that $\bigcup_{i \in I_1} A_i = \bigcup_{i \in I_2} A_i = \ldots = \bigcup_{i \in I_r} A_i \neq \emptyset$."

p. 28, line 20 should say "Now M is a $(n+d) \times (n+d-1)$ matrix."

p. 39, Theorem 9.1 is valid for $d = 1$ as well.

p. 45, Theorem 11.1 is valid for $d = 1$ as well.

p. 59, line 7-8 should read "Note that either T_2 or T_3 contains at least $t/12$ points of C_2'''."

p. 68, last line of Theorem 17.2 should be ".. of the Y_i have the same order type."

p. 68, line 15 the containments go in the other direction: $X_i = X_i^0 \supseteq X_i^1 \supseteq \ldots \supseteq X_i^{2^d-1} = Y_i$.

p. 69, Exercise 17.5 is based on Theorem 4 in [Bárány, Valtr, Discrete and Comp. Geometry, 19 (1998)]. Unfortunately, the statement there is not right and it is not clear how to correct it. Here is a possible version of the positive fraction Tverberg theorem and I leave it to the reader to prove or disprove it.

Theorem Assume $d, r \in \mathbb{N}$, $r \geq 2$ and set $n = (r-1)(d+1)+1$. Then there is a positive constant $c(r,d)$ such that given sets $X_1, \ldots, X_n \subset \mathbb{R}^d$, there are subsets $Y_i \supset X_i$ with $|Y_i| \geq c(r,d)|X_i|$ for every $i \in [n]$ such that every transversal of the system $Y_1, \ldots, Y_n$ has the same set of Tverberg partitions.

p. 71, line 16 should read ".. by the lines through y_{i-1}, y_i and y_{i+1}, y_{i+2}."

p. 72, bottom: after introducing two partial orderings, S_i is to be replaced by Z_i four times.

p. 73, in Figure 18.3 right the picture of the outer convex chains is wrong, it should look concave. In the Solution Manual Figure 18.1 shows a proper outer convex chain.

p. 117, typo in Exercise 28.1: the inequality $(d-1)p < (q-1)d$ should go with $<$ sign (and not with $\leq$).

p. 118, two typos in Exercise 28.5, in both upper bounds. The right form is: "Show that in Fact 28.4 $\nu^*(\mathcal{F}) \leq (d+1)\binom{d(p-1)+1}{d+1}$, and $\tau(\mathcal{F}) \leq 2^{d+1}(d+1)^d \nu^*(\mathcal{F})^{d+1}$."

p. 125, a simpler and more transparent way of finishing the proof is to show that for a finite family $\mathcal{H}$ of d-intervals $\tau(\mathcal{H}) \leq d\tau^*(\mathcal{H})$.

p. 127, just above Theorem 31.1 should say ".. an early (and elegant) result of Lovász."

p. 135, typo in Exercise 32.2 where K is written instead of K^*.

p. 141, in Theorem 33.7 the condition that each $\mathcal{C}_i$ satisfies the $(p, d+1)$ property is to be replaced by the following: "Assume that whenever we choose, for each $i \in [d+1]$, distinct sets $F_{i_1}, \ldots, F_{i_p} \in \mathcal{C}_i$, there are subscripts $j_1, \ldots, j_{d+1} \in [p]$ such that $\bigcap_{i=1}^{d+1} F_{j_i} \neq \emptyset$."