362L Homework set 4 **February 25, 2019**

Due Date: March 6, 2019

["H & G" refers to our textbook. Show a *complete solution* to each question, justifying results or assumptions needed. Many of the questions are quite simple and straightforward. Where specific information about various particles is needed, consult reliable on-line sources.]

(1) 10.16

(2) 10.17

(3) 10.19

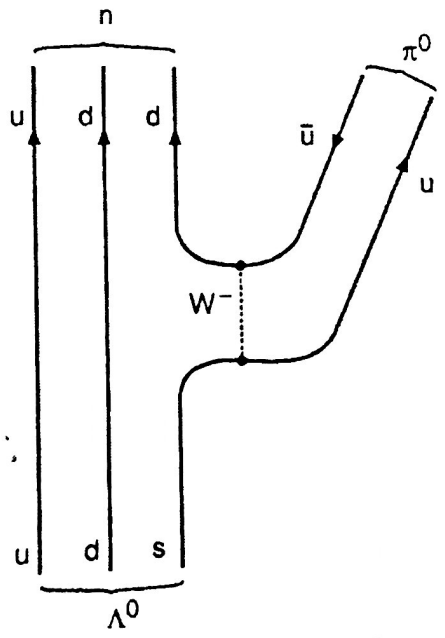
(4) 10.25

(5) In drawing diagrams for hadronic weak processes, people usually draw so-called "quark line diagrams," in which baryons are drawn as 3 parallel lines for the 3 valence quarks, and mesons are drawn as 2 parallel lines for the valence quark-antiquark pair. [Alas, in weak interactions quark flavors mix in insanely complex ways, as indicated in Sec. 11.9. Ignore this completely for now.] An example of such a diagram is shown below. Draw similar diagrams for (a) $K^+ \to \pi^+ + \pi^0$. (b) $\pi^+ \to \mu^+ + \nu_\mu$. (c) $K^0 \to \pi^- + e^+ + \nu_e$. (d) $\bar{\nu}_\mu + p \to \mu^+ + n$, (e) $\pi^- + p \to \Lambda^0 + \pi^0$. Consult standard tables for simple "valence quark" content of the various baryons and mesons, if needed.

(6) 11.35

(7) 12.3

(8) 12.8



"Quark line" Feynman diagram for the weak decay of a Λ^0 baryon.