I. Surface Anatomy – KNOW Fig. 14.1
   A. General
      1. begins at foramen magnum as continuation of brain stem (medulla oblongata)
      2. ends at L₁ (~ 45cm)
      3. 31 segments defined by origin of a single pair of nerves, and named for where
         those nerves emerge
            Ex.: spinal cord segment S₁ is actually parallel to vertebra T₁₂
      4. Four regions follow same system: cervical, thoracic, lumbar, sacral
   B. Features
      1. cervical enlargement (C₄ - T₁)
         lumbar enlargement (T₉ - T₁₂)
      2. anterior (ventral) median fissure - wider, deeper
         posterior (dorsal) median sulcus
      3. medullary cone (conus medullaris) - tapered distal end
      4. since cord is shorter than column, lumbar and sacral nerves pass inferiorly
         forming cauda equina
   II. Protection – KNOW Fig. 14.2
   A. Vertebral column
      - vertebral canal
      - vertebral arch (lamina + pedicle)
   B. Meninges (sing. = meninx) - c.t. coverings
      * epidural space - between dura mater and vertebral canal
         - filled with fat and c.t.
         1. dura mater - outermost
            “tough mother” - dense, irregular c.t.
            - stops at S₂
         2. arachnoid - middle layer, avascular
            “spidery” - thin layer against deep surface of dura that gives rise to web-like
                        extensions of collagen & elastic fibers to pia mater
      * subarachnoid space - filled with CSF
         - lumbar cistern is subarachnoid space inferior to medullary cone (site of spinal tap)
      3. pia mater - innermost, thinnest layer
         - adheres tightly to surface of cord, holding blood vessels in place
         - collagen + few elastic fibers
         - terminal filum is an extension anchoring cord inferiorly (~ S₅)
         - denticulate ligaments – lateral sheets with ~ 20 tooth-like extensions
            “tooth-like” - suspend and anchor cord within dura mater
III. Cross-sectional anatomy - Fig. 14.2

A. gray matter - highly organized collections of nuclei
   * ventral (anterior) horn - skeletal motor neuron cell bodies
   * lateral horn - smooth, cardiac, gland motor neuron cell bodies
   * dorsal (posterior) horn
     - gray commissure
     - central canal

B. white matter – arranged in 3 columns which contain multiple tracts (fasciculi – not exactly the same as a fascicle in a spinal nerve)
   * ventral (anterior) column
   * lateral column
   * dorsal (posterior) column

   - all axons within a given tract have a similar origin, destination and function (Fig. 14.3)
     • ascending (sensory) tracts
     • descending (motor) tracts

C. PNS connections
   - ventral root carries motor axons from CNS (afferent)
   - dorsal root carries sensory axons into CNS (afferent)
   - dorsal root ganglion contains sensory cell bodies – Fig. 14.8 & 14.19

IV. Functions

A. Conduction pathway (white matter) – Fig. 14.3
   - tract name tells you if it is ascending/descending sensory/motor
     Ex: anterior spinothalamic - sensory to brain
corticospinal - motor from brain

B. Integration centers (gray matter)
   1. spinal reflexes – KNOW Fig. 14.19
      - fast, automatic (involuntary), predictable, response to stimuli

     🌱 sensory receptor ➔ 🌱 sensory neuron ➔ 🌱 integrating center ➔ 🌱 motor neuron ➔ 🌱 effector
       (posterior root)     (gray matter)       (anterior root)
       (afferent)           (efferent)

   2. Locomotion
      - central pattern generators for coordinating repetitive muscle activity
V. Spinal nerves – Fig. 14.10
  A. Formation and branches
  -- sketch --

- several rootlets unite to form a root
- dorsal and ventral roots unite to form a spinal nerve
- almost immediately, a dorsal & a ventral ramus branch off nerve
- spinal nerves are mixed (sensory and motor) nerves

B. Names
8 cervical
12 thoracic
5 lumbar
5 sacral
1 coccygeal
31 pairs of spinal nerves → All but T2 - T12 form plexuses (Fig. 14.9) (intercostal nerves) ← “braid”

C. Dermatomes - Fig. 14.18 (highly inaccurate)
- area of skin providing sensory input to a given nerve
- clinically useful, but overlap

SKETCH