I. Nerves (Peripheral nervous system)
   A. A cord-like bundle of axons and dendrites that emerge from the central nervous system.
      1. Each neuron process is wrapped by a loose connective tissue covering called the **endoneurium**.
      2. Groups of axons are grouped together into bundles called **nervous fascicles**.
      3. The fascicles are wrapped by a **perineurium**.
      4. Each nerve is surrounded by an **epineurium**.
      5. These connective tissue wrapping act to insulate the neurons and prevent the spreading of action potentials between adjacent neurons.
      6. Nerves can be classified according to the direction they transmit impulses.
         a. **Sensory nerves** only transmit sensory impulses towards a central nervous system organ (i.e. Olfactory and Optic Nerves).
         b. **Mixed nerves** carry both sensory information towards the central nervous system and motor information away from the central nervous system towards a muscle or a gland. Most nerves are mixed.
   B. Cranial nerves
      1. 12 **pairs** of nerves that emerge from the brain stem (midbrain, pons and medulla oblongata).
         a. **Olfactory nerve (I)** carries sensory information from the nose for smell.
         b. **Optic nerve (II)** carries sensory information from the eye for vision.
         c. **Oculomotor nerve (III)** controls movement of eyelid and eyeball; accommodation of lens and constriction of pupil; eye muscle sense.
         d. **Trochlear nerve (IV)** controls movement of eyeball and eye muscle sense.
         e. **Trigeminal nerve (V)** controls skeletal muscles of the head for chewing; sensation from the face for touch, pain, temperature and muscle sense.
         f. **Abducens nerve (VI)** controls movement of the eyeball and eye muscle sense.
         g. **Facial nerve (VII)** controls skeletal muscles of the face for facial expression; stimulates secretion of saliva and tears; supplies sensory for taste.
         h. **Vestibulocochlear nerve (VIII)** conveys impulses to the ear for hearing and impulses for equilibrium.
         i. **Glossopharyngeal nerve (IX)** stimulates secretion of saliva; senses taste; monitors blood pressure and blood gasses.
         j. **Vagus nerve (X)** stimulates smooth muscle contraction and relaxation; secretion of digestive fluids; sensation for organs supplied; muscle sense.
         k. **Accessory nerve (XI)** controls muscles for swallowing and movements of head and shoulders; muscle sense.
         l. **Hypoglossal nerve (XII)** controls muscles of tongue for speech and swallowing; muscle sense.
   C. Spinal nerves
      1. 31 pairs of nerves that emerge from the spinal cord.
         a. 8 cervical
         b. 12 thoracic
         c. 5 lumbar
         d. 5 sacral
         e. 1 coccygeal
      2. The spinal nerves are attached to the spinal cord by nerve roots.

a. **Dorsal roots**
    i. Carry sensory information into the spinal cord.
    ii. The **dorsal root ganglion** contains cell bodies of sensory neurons.
b. **Ventral roots**
    i. Carry axons of motor neurons (lower motor neurons and preganglionic neurons) away from the spinal cord.

3. Exit the spinal column via the **intervertebral foramina**.
4. Immediately after exiting the foramina the spinal nerve generates **branches (rami**).
    a. There are 5 branches formed off the spinal nerve.
        i. Meningeal branch
        ii. Dorsal branch
        iii. Ventral branch
        iv. White rami
        v. Gray rami
    b. Within the thoracic region the ventral branches becomes the **intercostal nerves**.
        i. These nerves supply the muscles between the ribs, abdominal muscles and skin of the chest and back.
    c. Within the other regions of the spinal cord the ventral branch is also the source of the 4 nerve **plexuses**.
        i. A plexus is formed by adjacent spinal nerve branches interlacing together, allowing axons from separate spinal nerve levels to intermingle.
        ii. The plexuses generate nerves to supply specific structure or regions of the body.
        iii. The **cervical plexus** supplies muscles of the neck and shoulders; the skin around the ear and the front of the neck; supplies the diaphragm with the **phrenic nerve**.
        iv. The **brachial plexus** provides the entire nerve supply to muscles of the upper extremities (musculocutaneous, axillary, median, radial and ulnar nerves).
        v. The **lumbar plexus** supplies nerves to the abdominal wall, external genitals and part of the lower extremities (ilioinguinal, femoral and obturator nerves).
        vi. The **sacral plexus** supplies nerves to the buttocks, perineum and lower limbs (gluteal, sciatic and pudendal nerves).