1. Please list the four major anatomical structures that work together to regulate testicular temperature in most domestic animals and provide a brief description of the specific function of each structure (4 pts). (Hint: two structures are associated with the scrotum and two structures are located within the spermatic cord)
   a) Cremaster muscle: Primary function is to facilitate blood flow to pampiniform plexus by either relaxing or contracting. Secondary function is to raise testis during fight or flight.
   b) Tunica dartos: Smooth muscle in scrotum that acts as a thermoregulator by contracting during cold temperatures to draw the testes closer to the abdomen or relaxing when warm to move the testes away from the abdomen.
   c) Scrotum: Composed of a thin skin and sweat glands, which allows evaporative cooling to dissipate heat.
   d) Pampiniform plexus: Allows for counter current heat exchange between the warmer arterial blood flowing toward testes and the cooler venous blood flowing toward body. The temperature exchange allows for cooling of arterial blood as it enters the testes and functions to keep the testes 4-6°C cooler than the body.

2. Please provide a brief explanation of the collective importance of the four structures listed in the previous question (#1) as it relates to temperature differences between the body and the scrotum. Please indicate what the temperature differences are and explain how this relates to the fertility of the sperm cells being produced and eventually ejaculated (1 pt).

   The structures work collectively to modulate testes temperature so it is 4-6°C lower than body temperature. The lower temperature prevents sperm from being heat shocked, which could result in damage to the sperm and lead to decreased fertility.

3. Please describe the two major functions of the testes and list the specific cells and (or) structures that are responsible for each respective function (2 pts).
   a) Gametogenic (sperm or gamete cell production). Seminiferous tubules & sertoli cells
   b) Steroidogenic (endocrine) produces testosterone. Leydig cells (interstitial cells)

4. The epididymis is a long coiled structure associated with each testis. Please list the three different sections of the epididymis as well as the three primary functions of the epididymis (2 pts).
   a) Sections: Caput (Head), Corpus (Body), Cauda (Tail)
   b) Functions: transport, maturation, and storage

5. Please provide the range in semen volume (mL) of a natural ejaculate of the following animals (1 pt).
   Cat: 50 – 250 uL    Bull: 2-7 mL    Stallion: 60-90 mL    Boar: 100-300mL    Ram: 0.5-2.0 mL

Continued on the back!!!!!
6. The cat (feline) and dog (canine) penis are unique and very different compared to farm animals. Please provide a short **description** of what makes the anatomy of the cat and dog penis so unique. Additionally, indicate which **accessory sex glands** each respective species contains (2 pts).

   a) **Dog**: “OS “ penis or baculum and a vascular bulb in the shaft of the penis. **Prostate gland**.

   b) **Cat**: Spines on end of penis. **Prostate and bulbourethral gland**.

7. Please **identify** the gross anatomical structures of the bull in the figure below. Fill-in-the-blanks with the name of the structure (spell-out entire name) that corresponds with its respective letter in the figure. Also **circle the letters in the figure & answer blanks** of the **three accessory sex glands** that are present in the bull, ram, boar, & stallion (9 pts). (Note: There are hints with some of the structures to assist you in identifying the correct answer).

   **a) Cowpers or Bulbourethral gland** *(Accessory gland)*
   **b & c) Prostate gland** *(Forms one accessory gland)*
   **d) Retractor penis muscle** *(Smooth muscle)*
   **e) Sigmoid Flexure** *(S-shaped structure)*
   **f) Spermatic cord** *(general area in circle)*
   **g) Head (caput) epididymis*  
   **h) Scrotum** *(multilayered structure that houses "k")*
   **i) Body (corpus) epididymis*  
   **j) Tail (cauda) epididymis*  
   **k) Testis** *(Entire ovoid shaped structure)*
   **l) Glans penis** *(Tip of this structure)*
   **m) Vas deferens or ductus deferens** *(connects structures a” & j”)*
   **n) Bladder*  
   **o) Ampulla*  
   **p) Seminal vesicles** *(Accessory gland)*