For questions 1-10, circle the letter corresponding to the correct statement(s). None, one or more of the selections may be correct. Don’t guess—incorrect responses will be deducted from your score (5 each; 50 total).

1. The following are true statements regarding organophosphates:
   a. malathion has a higher oral and dermal LD$_{50}$ value than parathion
   b. act acutely--none cause persistent nervous system effects
   c. parathion can be purchased at Fred Meyer
   d. malathion can be purchased at Fred Meyer
   e. 2-PAM should be used as part of treatment for all organophosphate poisonings

2. Regarding chemical absorption in the body:
   a. all other things being equal, a weak acid is more easily absorbed than a weak base in an acidic environment
   b. all other things being equal, a weak base is more likely to be re-absorbed from the urine than a weak acid
   c. chemicals with a higher partition coefficient have a higher lipid solubility and are therefore more able to penetrate biological membranes
   d. a fat person may be "protected" from the effects of a toxic, lipid soluble chemical
   e. chemical absorption through the eye is generally more rapid than through skin

3. For a chemical whose zero-order input is 0.10 mg day$^{-1}$ and first-order elimination at 5.0 x 10$^{-6}$ min:
   a. $X_{\text{max}}$ apx. 1.4 mg
   b. $X_{\text{max}}$ apx. 14 mg
   c. $X_{\text{max}}$ apx. 20,000 mg
   d. time-to-plateau apx. 14 days
   e. time-to-plateau apx. 97 days

4. The following are true about pesticides.
   a. They are designed and manufactured to kill insects and plants and are therefore safe for human consumption.
   b. The use of *Bacillus thuringiensis* endotoxin is declining in the US due to the increased popularity of organic farming.
   c. California mosquito abatement employees have the highest frequency of pesticide poisoning because of their exposure to pesticides at work.
   d. Are not economically practical since pesticide costs amount to more than crop losses would without pesticides.
   e. Insecticides are the most frequently purchased form of pesticide in the US.
5. The following statements are correct toxin / antidote pairs:
   a. linamarin / sodium nitrite
   b. linamarin / sodium thiosulfate
   c. Cr³⁺ / vitamin C
   d. strychnine / KMnO₄
   e. ethyl parathion / alkaloid from Belladonna

6. The following are correct toxin / symptom combinations:
   a. lead / Burton’s line
   b. mercury / birth defects
   c. thallium / elopecia
   d. sodium nitrite / dark complexion
   e. CO / red complexion

7. The following are correct toxin / disease pairs:
   a. cyanide / sodium nitrate
   b. anthracene / cancer
   c. PCB / chloracne
   d. sodium nitrite / methemoglobinemia
   e. cadmium / Itai Itai

8. The following are correct toxin / incident pairs:
   a. Cadmium / Minamata Bay
   b. DNOC / “Ginger Jake”
   c. Methyl parathion / Bhopal
   d. Cyanide / Jonestown
   e. DDT / Seveso

9. The following are true about pesticides:
   a. chlorophenoxy herbicides have poor water solubility
   b. 2,4-D was banned by EPA because of contamination with TCDD
   c. strychnine formerly used as aphrodisiac
   d. methylisothiocyanate is used as a starting material for a carbamate insecticide
   e. lindane is also called BHC

10. These following are correct toxin / inhibited enzyme pairs:
    a. 1080 / acetyl Co enzyme A
    b. dinitrophenol / cytochrome oxidase
    c. jasmolin / ATPase
    d. GB / acetylcholinesterase
    e. lead / δ-amino levulinic acid synthetase
For 11-18, provide a **concise** (1-2 sentence) explanation of the following observation or phenomena (5 each; 40):

11. Sarin (a nerve gas) is way more potent than parathion.

12. Treatment with atropine is not recommended for \textit{p}-nitrophenol poisoning

13. Cows grazing on some varieties of sweet clover bruise easily

14. Oral strychnine spray was used by opera singers.

15. Many people buy brown paper coffee filters rather than the white ones.

16. A potently toxic chemical may have a low hazard rating, while a moderately potent chemical may have a high hazard rating.

17. LD\textsubscript{50} of a i.v.-administered chemical is almost always lower compared to oral route

18. Treatment with atropine is not recommended for carbaryl poisoning
19. A train derailment on the Union Pacific line in Weber Canyon near Morgan UT resulted in the spill of the three chemicals MTBE (left) diquat (middle) and 2,4-D (right). The soil type surrounding the railroad is sandy, rocky soil with some clay and virtually no organic material. a) Provide a detailed comparison of the chance of contamination of Weber River by these chemicals; b) all else equal, compare their ability to evaporate from water; c) compare their relative persistence in the environment; d) with this knowledge, propose steps to contain this spill, minimizing contamination to the river. e) What is the main use of each of these chemicals? (15)
20. DDT was canceled in this country in 1971. a) What were the main concerns regarding DDT? b) Draw the chemical structure of DDT, its major metabolite, (name it), and explain why metabolism of DDT does not result in increased excretion; c) What close "relatives" to DDT is now viewed as it's alternative? d) As the DDT "replacement," what are its (their) advantages and disadvantages? e) Compare the metabolism of DDT with one of these chemicals (15).
21. A naturally occurring pesticide is often used to control fish species in lakes and reservoirs. a) Identify this compound, and its natural source; b) what is its mechanism of action? c) how would you treat an accidental poisoning? d) compare its toxic potency to fish and mammals; d) discuss why this compound is more “environmentally friendly” compared to others. (20)

22. Super bonus question: Name these actors appearing in Toxicology Goes Hollywood: