1. (6 pts) In the space provided, explain the possible therapeutic rationale for using a multivitamin supplement that does not contain Vitamin B₆ in patients with Parkinson's disease. Include patients on either levo-DOPA or Carbidopa.

L-DOPA crosses the Blood-Brain Barrier (BBB) into the CNS where it is decarboxylated by a B₆-dependent enzyme to its active form, dopamine. Patients with very high systemic B₆ levels will have L-DOPA decarboxylated prior to crossing the BBB. Dopamine will not cross through BBB and is ineffective in treating Parkinson's. Combining L-DOPA with Carbidopa eliminates this problem because Carbidopa inhibits the systemic decarboxylase.

2. In the space provided, respond to the statement that: Vitamin C supplements reduce the incidence of the common cold.

No scientific data from well-controlled studies support this statement. Data suggest that Vitamin C may decrease the duration of a cold.
Rettie, Part II (26 pts)

3. (14 points) The two structures shown below (A and B) are precursors to fat-soluble vitamins that require either an enzymatic or chemical transformation to their respective vitamin forms.

i) Identify the enzyme or physical process involved in A→B and C→D. (4)

ii) Draw the full structures of B and D. (4)

![Chemical structures]

iv) Show an arrow-pushing mechanism for the formation of D. (4)

v) Where in the body does the next step in the activation of D occur? (2)
4. (5 points)

a) Acitretin, shown below, is a **2nd** generation oral retinoid used to treat psoriasis. Fill in the blank. (1)

![Acitretin molecule](image)

Acitretin should not be used by pregnant women, or those planning to become pregnant, for **three years after discontinuation** of the drug in order to avoid the risk of severe birth effects.

b) Explain fully why there is such a long interval period recommended (4)

*All oral retinoids have a risk of causing birth defects. The very long interval required for this drug is a consequence of the ultra-long half-life (3-4 months) of the ethyl ester of acitretin, which is generated in the body after consumption of alcohol. It would be necessary to wait for years (i.e. 7 half-lives to eliminate >99%) to ensure that all of the ethyl ester ‘metabolite’ had been eliminated from the body, assuming that the patient could have consumed alcohol while taking the drug.*

5. (7 points)

a) Vitamin E effectively quenches lipid peroxyl radicals (ROO·) according to the scheme below. Draw full structures for X and Y (3)

![Vitamin E reaction](image)

b) Y still poses a biological risk because it can alter membrane function. Identify the glutathione enzyme that detoxifies Y and the mineral that is critical for its function. (4)

*Glutathione Peroxidase requires Selenium.*