Name:

BIOL415 Quiz #3:

1. In your opinion, which species concept is the most useful? Why? (2–3 sentences; 2 pts).

Any answer that clearly describes a species concept (1 pt) and logically defends its utility (1 pt).

2. If a pre-zygotic and a post-zygotic reproductive barrier were equal strength, which would contribute more to reproductive isolation and why? (1–2 sentences). 2 pts.

Model answer: The pre-zygotic (1pt) because it acts earlier and thus represents more of the realized reproductive isolation (1pt).
Example:
Before barriers: 100% reproduction
After pre-zygotic: 100% * 0.5 = 50% reproduction
After post-zygotic 50% * 0.5 = 25% reproduction
Pre-zygotic barrier reduced reproduction by 50% while post-zygotic only reduced it by 25% because there was only 50% left.

3. Describe the "paradox of underdominance" in the context of the evolution of reproductive isolation (2–3 sentences). 2 pts.

Model answer: The paradox of underdominance results from the fact that strongly underdominant arrangements or alleles provide strong barriers to gene flow (1pt), but are unlikely to evolve because the individuals carrying them initially as heterozygotes will have greatly reduced fitness (1 pt).

4. On a trip to northern Manitoba you decide to do some karyotyping of the local flora. You discover a population of Arctic raspberries (*Rubus arcticus*) that includes a polyploid individual (2n = 28). Describe a possible scenario that could have resulted in the creation of this polyploid. 1 pt.

Model answer (any of the following):

- This polyploid could have resulted from a somatic mutation in a cell line that created reproductive structures with reduced 2X gametes, which then fused to create a tetraploid.
- These polyploids could have resulted from the fusion of two unreduced gametes (2X), either from the same parent or different parents (including possibly a different species).
- These polyploids could have formed via a triploid bridge, where the fusion of an unreduced gamete with a reduced gamete resulted in a 3X individual, who produced an unreduced gamete that again fused with a reduced gamete to form a tetraploid.