**Abbott: A**

1. Verification of Riley’s result (Fig. 21) **Full marks**

Sensitivity for p, R0, r, g, 1-N, ±20% **Full marks**

Relative sensitivity of various parameters **Full marks**

Comparison to Riley’s 27% error **Full marks**

2. Conditions for P to be periodic **Full marks**

Find a value of g that ensures periodicity **Full marks**

How does the value vary as other parameters are changed? **Full marks**

3. Perturb the periodic model with 20% random variations in Z and discuss

**Full marks. You solved a slightly different problem than was posed: random perturbations were added to both P and Z rather than just Z. In any case, you did a very thorough job. Your solution does not have a long term trend, whereas the perturbations to Z only can result in long term increases and decreases. The random term means that ln P(t+1yr) deviates from ln P(t) by a random number with zero mean. As a result, ln P(n\*yr) undergoes a random walk and can reach very high or very low values. This points to the need for nonlinearity in the dynamics.**