1. Suppose that a population of birds on an island grows at a rate of 
\[
\frac{4500e^{-0.05t}}{(1 + 9e^{-0.05t})^2}
\] birds/year, where \( t \) is measured in years since 2000, and that the population in the year 2000 was 15000 birds. In the long run (as \( t \to \infty \)) the population will level off at some limiting population.

   (a) Express this limiting population in terms of an improper integral.

   (b) Compute the integral to find the limiting population.

2. Complete the following table.

<table>
<thead>
<tr>
<th>( p )</th>
<th>1/2</th>
<th>0.99</th>
<th>1</th>
<th>1.01</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \int_{1}^{\infty} \frac{1}{x^p} , dx )</td>
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Now generalize the results from the table. Fill in the blanks:
\[
\int_{1}^{\infty} \frac{1}{x^p} \, dx \text{ converges if } p \quad \text{and diverges if } p \quad .
\]

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