Write neatly on this sheet or on a separate sheet of paper.

1. Find a solution to the initial value problem

\[
\frac{dy}{dx} = \sqrt{1 - y^2 \sec^2(x)}
\]

\[y(0) = 0\]

2. Find \( T_{14}^0 e^{x^6} - \frac{1}{1-x} \).

3. Find

\[
T_{\infty}^0 x \left( e^x - \frac{1}{1-x} \right)
\]
4. A 100 litre vat of water begins with an algae concentration of 1,000 organisms per litre. Suppose that the algae naturally reproduce at a rate of five percent per minute and die at a rate of four percent per minute. If the vat is being drained at a rate of one litre per minute, what will the algae concentration be ten minutes from now? You should assume that the algae are uniformly distributed in the vat. Remember to define your variables with units.