Math 165 - Homework 9  
(differential equations, Σ-notation, area)

Problem 1 Solve the differential equation (hint - completing the square helps at some point).
\[
\frac{dy}{dx} = \frac{\cos x}{2y + 6}
\]

Problem 2 Find the general solution of the differential equation below (involving a constant \( C \)), then find the particular value of \( C \) so that your solution satisfies \( y(2) = 1 \).
\[
\frac{dy}{dx} = \frac{8}{3}xy^4
\]

Problem 3 Find an equation for a curve through the point \((1, 9)\) whose slope at any of its points equals 3 times the square root of its \( y \)-coordinate.

Problem 4 Write the sum below in Σ-notation.
\[
S = \frac{1}{10} - \frac{2}{11} + \frac{4}{12} - \frac{8}{13} + \cdots + \frac{1024}{20}
\]

Problem 5 A grocer stacks oranges in a pyramidlike pile. If the bottom layer is a rectangle with 35 rows of 45 oranges each, and the top layer has exactly one row of oranges, how many oranges are in the stack? Do not use dots but use Σ-notation at least once in some appropriate place.