

BC Module 7 DBA (written portion)

This is a **NON-CALCULATOR** assignment. Show all your work to support your answers.

(5 points each)

Consider the differential equation $\frac{dy}{dx} = y^2(x + 2)$. Let $y = f(x)$ be the particular solution to the differential equation with initial condition $f(0) = -2$.

- (a) Find $\lim_{x \rightarrow 0} \frac{f(x)+2}{\sin x}$. Show the work that leads to your answer.
- (b) Write an equation for the line tangent to the graph of f at the point $(0, -2)$. Use the tangent line to approximate $f(0.3)$.
- (c) Use Euler's method, starting at $x = 0$ with two steps of equal size, to approximate $f(1)$.
- (d) Find $y = f(x)$, the particular solution to the differential equation that passes through $(0, -2)$.