



# **BC.Q404.REVIEW ASSESSMENTS**

## **(Part 4)**

CH 6 (REVISITED) – DIFFERENTIAL EQUATIONS

(20 points)

NO CALCULATOR

NAME:

DATE:

BLOCK:

I (*print name*) \_\_\_\_\_ certify that I wrote and fully understand **all** marks made in this assessment. I did not write anything that I do not understand. I would now, having completed this assessment, be able to make similar (but equally accurate) responses if asked complete the same exact assessment on my own.

Signature:

1. Evaluate A.  $\int e^{5x} dx$     B.  $\int e^{\frac{x}{3}} dx$     C.  $\int 2 \sin(7x) dx$     D.  $\int 2 \cos\left(\frac{x}{9}\right) dx$

2. (No Calculator)

Let  $y = f(x)$  be the particular solution to the differential equation  $\frac{dy}{dx} = 6(14 - y)$  with  $f(0) = 2$ .

A. Find  $\frac{d^2y}{dx^2}$  in terms of  $y$ .

B. Use part A to find  $f''(0)$ .

C. Solve the differential equation by separating the variables.

3. (No Calculator)

Let  $y = H(t)$  be the particular solution to the differential equation

$$\frac{dH}{dt} = \frac{1}{2}(10 - H) \text{ with } H(0) = 2.$$

A. Use a linearization centered at  $t = 0$  to approximate the value of  $H(0.75)$

B. Solve the differential equation by separating the variables.

4. (No Calculator)

Let  $y = f(t)$  be the particular solution to the differential equation

$$\frac{dy}{dt} = \frac{1}{3}y(12 - y) \text{ with } f(0) = 5.$$

A. Find  $\lim_{t \rightarrow 0^+} \frac{f(t) - 5}{\sin(t/3)}$

B. Solve the differential equation without separating the variables.

*LOGISTIC (Memorize Solution)*

C. What is the value of  $y$  when  $f$  is growing the fastest?

D. What is the value of  $t$  when  $f$  is growing the fastest?

5. (No Calculator)

Let  $\frac{dy}{dx} = \frac{(1-y)}{x^2}$  where  $y = f(x)$  is the particular solution to the differential equation with the condition  $f(2) = 0$ .

- A. Use the line tangent to  $f$  at  $x = 2$  to approximate  $f(1)$
- B. Use Euler's method starting at  $(2,0)$  with step size  $\Delta x = -0.5$  to approximate  $f(1)$ .
- C. Solve the differential equation by separating the variables.

6. Let  $y = f(x)$  be the particular solution to the differential equation

$$\frac{dy}{dx} = \cos x + 2y^2 \quad \text{with } f(0) = -3.$$

A. Find  $f'(0)$

B. Find  $f''(0)$ .

C.  $\lim_{x \rightarrow 0} \frac{f(x) - 19x + 3}{5x^2}$