BC.Q404.REVIEW ASSESSMENTS (Part 4)

CH 6 (REVISITED) – DIFFERENTIAL EQUATIONS

(25 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 $\dfrac{dy}{dx} = 6(14 - y)$ with $f(0) = 2$.

A. Find $\dfrac{d^2y}{dx^2}$ 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

$\frac{dH}{dt} = \frac{1}{2}(10 - H)$ 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

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

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

B. Solve the differential equation <u>without</u> 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
$\frac{dy}{dx} = \cos x + 2y^2$ with $f(0) = -3$.

A. Find $f^{/}(0)$

B. Find $f^{//}(0)$.

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