AB

Advanced Calculus

AB.Q403.REVIEW ASSESSMENT (PART C)

DIFFERENTIAL EQUATIONS

(20 points)

NO CALCULATOR

NAME:

DATE:

BLOCK:

I (*print name*)_____ certify that I wrote **all** marks made in this assessment. I did not write **anything** that I do not fully 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.

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

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

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

C. Solve the differential equation by separating the variables.

3.

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

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

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 $f'(0)$

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

C. Find $\lim\limits_{t \to 0^+} \dfrac{f(t) - 5}{\sin(t/3)}$

5.

Let $\dfrac{dy}{dx} = \dfrac{(1-y)}{x^2}$ 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. Solve the differential equation by separating the variables.

6.

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

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

A. Find $f'(0)$

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

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