BC Calculus Units 6-8 Quiz Review WS 2

Evaluate the below: Show all work!

1)

The function f has a continuous derivative. The table gives the values of f and its derivatives for $x = 2$ and $x = 7$. If $\int_2^7 f(x)\,dx = 10$, what is the value of $\int_2^7 2xf'(x)\,dx$?

x	$f(x)$	$f'(x)$
2	3	5
7	9	-4

2) $\int 3x \ln x^2\,dx$

3) $\int x \cos 4x\,dx$

4) $\int \frac{4x+1}{2x^2-3x-2}\,dx$

5) $\int_2^{\infty} \frac{3}{x(x-1)}\,dx$

6) Non-Calculator (Show your work)

$$\int_0^5 \frac{1}{\sqrt{5-x}}\,dx$$

7)

Let $h(x) = \int_0^x \sqrt{1 + 4t^2}\, dt$. Use Euler's method, starting at $x = 0$ with two steps of equal size, to approximate $h(3)$.

8)

Let $y = f(x)$ be the solution to the differential equation $\frac{dy}{dx} = x + y$ with initial condition $f(0) = 3$. What is the approximation for $f(0.5)$ obtained using Euler's method with 2 steps of equal length, starting at $x = 0$?

9)

A populations rate of growth is modeled by the logistic differential equation $\frac{dP}{dt} = \frac{1}{1000} P(600 - P)$, where t is in days and $P(0) = 60$. What is the greatest rate of change for this population?

10) Using the logistic differential equation $\frac{dP}{dt} = \frac{1}{5}P - \frac{1}{2000}P^2$, identify the carrying capacity.

11)

A rate of change $\frac{dP}{dt}$ of a population is modeled by a logistic differential equation. If $\lim_{t\to\infty} P(t) = 1000$ and the rate of change of the population is 100 when the population size is 50, which of the following differential equations describe the situation?

A. $\frac{dP}{dt} = 50P\left(1 - \frac{P}{1000}\right)$

B. $\frac{dP}{dt} = 100P\left(1 - \frac{P}{1000}\right)$

C. $\frac{dP}{dt} = \frac{19}{40}P\left(1 - \frac{P}{1000}\right)$

D. $\frac{dP}{dt} = \frac{40}{19}P\left(1 - \frac{P}{1000}\right)$

12) **No Calculator.** Suppose $F(x) = \int_0^x \sqrt{3 - 4\sin^2 t}\ dt$. What is the length of the arc along the curve $y = F(x)$ for $0 \le x \le \frac{\pi}{3}$?

13)

Let R be the region bounded by the graphs of $f(x) = -x^2$ and $g(x) = -4$. Write an expression including one or more integrals that gives the perimeter of the region R. **Do Not Evaluate.**

14) $\lim_{x \to 0^+} (2x)^{3x}$

15) $\lim_{x \to 0^+} (\csc x)^{\sin x}$