

NAME:

DATE:

**CALCULATOR SECTION**  
**30 minutes**

AP CALCULUS AB – Q303 PRACTICE EXAM : CH5A (FTC2)

1[10]. Suppose  $f'(x) = \sin(x^2)$  and  $f(2) = 3$ . Find  $f(1)$ . Show reasoning.

2.[25] A water tank at Camp Newton holds 1200 gallons of water at time  $t = 0$ . During the time interval  $0 \leq t \leq 18$  hours, water is pumped into the tank at the rate

$$W(t) = 95\sqrt{t} \sin^2\left(\frac{t}{6}\right) \text{ gallons per hour.}$$

During the same time interval, water is removed from the tank at the rate

$$R(t) = 275 \sin^2\left(\frac{t}{3}\right) \text{ gallons per hour.}$$

- A. Is the amount of water in the tank increasing or decreasing at the time  $t = 15$ ? Justify.
- B. Write an equation, involving an integral expression, for  $A(t)$ , the total amount of water in the tank at time  $t$  on  $0 \leq t \leq 18$ .
- C. To the nearest whole number, how many gallons of water are in the tank at time  $t = 18$ ?
- D. For  $t > 18$ , no water is pumped into the tank, but water continues to be removed at the rate  $R(t)$  until the tank becomes empty. Write, but do not solve, an equation involving an integral expression that can be used to find  $t$ , the time it takes for the tank to empty.

Multiple Choice [5 points each]

81. If  $G(x)$  is an antiderivative for  $f(x)$  and  $G(2) = -7$ , then  $G(4) =$

(A)  $f'(4)$

(B)  $-7 + f'(4)$

(C)  $\int_2^4 f(t) dt$

(D)  $\int_2^4 (-7 + f(t)) dt$

(E)  $-7 + \int_2^4 f(t) dt$

87. An object traveling in a straight line has position  $x(t)$  at time  $t$ . If the initial position is  $x(0) = 2$  and the velocity of the object is  $v(t) = \sqrt[3]{1+t^2}$ , what is the position of the object at time  $t = 3$ ?

(A) 0.431      (B) 2.154      (C) 4.512      (D) 6.512      (E) 17.408

91. What is the average value of  $y = \frac{\cos x}{x^2 + x + 2}$  on the closed interval  $[-1, 3]$ ?

(A) -0.085      (B) 0.090      (C) 0.183      (D) 0.244      (E) 0.732

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NON CALCULATOR

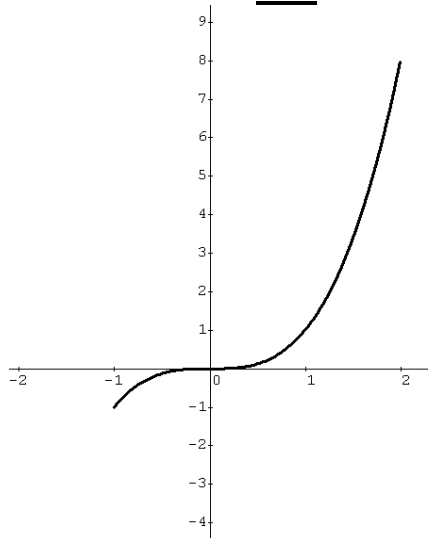
SECTION

30 minutes

AP CALCULUS AB – Q303 PRACTICE EXAM : CH5A (FTC2)

1[20]. Below is a graph of  $y = x^3$  from  $x = -1$  to  $x = 2$ .

Shade and find the area bounded by graph of  $y$  and the  $x$ -axis. Show work.



2[5].

Using the substitution  $u = x^2 - 3$ ,  $\int_{-1}^4 x(x^2 - 3)^5 dx$  is equal to which of the following?

(A)  $2 \int_{-2}^{13} u^5 du$

(B)  $\int_{-2}^{13} u^5 du$

(C)  $\frac{1}{2} \int_{-2}^{13} u^5 du$

(D)  $\int_{-1}^4 u^5 du$

(E)  $\frac{1}{2} \int_{-1}^4 u^5 du$

3[25]. A particle moves along the  $x$ -axis so that its velocity  $v(t)$  at time  $t \geq 0$  is given by the graph below.

The position of the particle at time  $t$  is  $x(t)$  and its position at time  $t = 0$  is  $x(0) = 5$ .

*Be sure to show the appropriate set up for each part.*

- A. Find the total distance traveled by the particle from time  $t = 0$  to  $t = 4$ .
- B. Find the position of the particle at time  $t = 4$ .
- C. Find the velocity and acceleration of the particle at time  $t = 0.5$ .
- D. Is the particle speeding up or slowing down at time  $t = 0.5$ ? Justify.

