BC.Q404.REVIEW ASSESSMENTS (Part 3)

CH 5B (REVISITED) – FTC1 and FTC2 (with approximations)

(20 points)

NO CALCULATOR

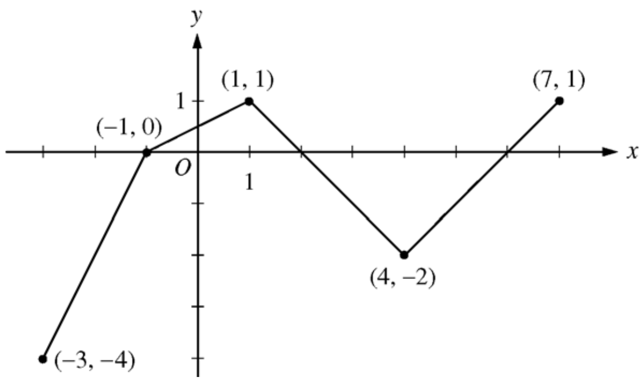
NAME:

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:



Gr

1. The graph of the function *f* above consists of four line segments.

Let *g* be the function given by $g(x) = \int_{-1}^{x} f(t)dt$

A. Find $g(2)$, $g'(2)$, $g''(2)$.

B. On what interval between $-3 < x < 7$ is *g* increasing? Justify your answer.

C. Find the *x*-coordinates of all points of inflection of the graph $y = g(x)$. Justify your answer.

D. Find the absolute maximum value of *g* on the interval $-3 \le x \le 7$. Justify your answer.

E. Find the average rate of change of $g'(x)$ on the interval $-3 \le x \le 7$. Does the Mean Value Theorem applied on the interval $-3 \le x \le 7$ guarantee a value of *c*, for $-3 < c < 7$, such that $g''(c)$ is equal to this average rate of change? Why or why not?

2. Find the following:

A. $\dfrac{d}{dx}\displaystyle\int_{-3}^{x} \sin\left(t^2\right)dt$

B. $\dfrac{d}{dx}\displaystyle\int_{-3}^{5x^2} \cos(t)dt$

3. Water enters a tank at the rate $g(t)$ cubic feet per hour. Select values of $g(t)$ are shown in the table below. Water drains from the tank at the rate $h(t) = 14e^{-t/10}$ cubic feet per hour. The tank initially holds 400 cubic feet of water.

t	0	5	10	15	20	25	30
$g(t)$	21	15	16	14	25	35	12

A. Approximate the total amount of water that enters the tank between 0 and 30 hours using a **trapezoidal** sum with six equal intervals.

B. Approximate the total amount of water that enters the tank between 0 and 30 hours using a **midpoint**-rectangle sum with three equal intervals.

C. Approximate the total amount of water that enters the tank between 0 and 30 hours using a **right** Riemann sum with six equal intervals.

D. How much water left the tank over the first 30 hours?

REMEMBER … NO CALCULATOR HERE

E. Use part A to approximate the amount of water in the tank at time $t = 30$.

OK FINE … USE YOUR CALCULATOR HERE --- PART E

F. Is water volume increasing or decreasing at time $t = 10$? Justify.

4. A particle starts at $x = 6$ and moves along the x-axis. Its velocity, in feet per second, was recorded at several times as shown in the chart below. Note: v is a differentiable function of t.

t (seconds)	$v(t)$ (feet per second)
0	10
3	15
5	21
10	16
12	19

A. Approximate $\int_0^{12} v(t)dt$ using a trapezoidal sum with 4 intervals. Using correct units, explain the meaning of the integral.

B. Approximate the acceleration of the particle at $t = 3$ seconds. Indicate the units.

C. Find the average acceleration of the particle over the interval $0 \le t \le 12$.

D. Estimate the average velocity of the particle over the interval $0 \le t \le 12$.

E. Based on the values in the table, what is the smallest number of instances at which the acceleration of the particle could equal zero on the open interval $0 < t < 12$. Justify.

F. Approximate the location of the particle at $t = 12$ seconds.