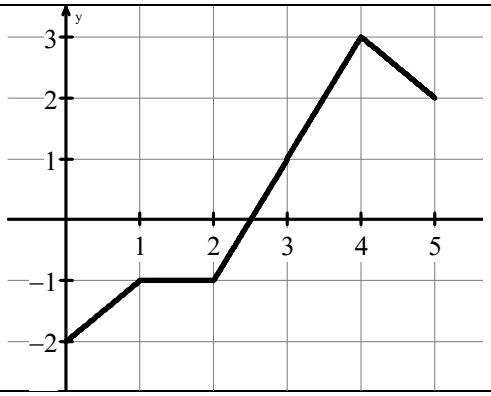
Name: Solutions Date:_____ Period: _____ **Review**

Mid-Unit 6 Review – Integration and Accumulation of Change

Lessons 6.1 through 6.5

Reviews do NOT cover all material from the lessons but will hopefully remind you of key points. To be prepared, you must study all packets from Unit 6.

1. Let $g(x) = \int_a^x f(t)\,dt$ with the graph of f shown above and a is a constant. Find the x-values of g regarding each of the following conditions.



a. Relative minimum(s)

$x = 2.5$

b. Relative maximum(s)

none

c. Concave up

$(0,1)$ and $(2,4)$

d. Concave down

$(4,5)$

e. Increasing

$(2.5, 5)$

f. Decreasing

$(0, 2.5)$

g. Point(s) of inflection

$x = 4$

h. Given $h(x) = \int_0^{\frac{x}{4}+1} f(t)\,dt$. Find the x-value where h has a relative minimum.

$\frac{x}{4} + 1 = 2.5$ $\quad \frac{x}{4} = 1.5$ $\quad x = 6$

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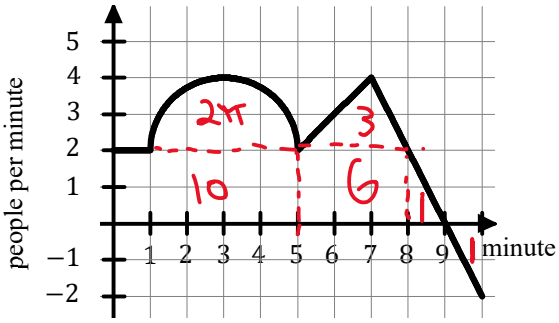
2. The graph below shows the rate of change of the number of people in line for a concert.



a. How many people has the line gained or lost after 5 minutes? Round or truncate to 3 decimal places.

gained $10 + 2\pi$ people

(16.283)

b. How many people has the line gained or lost after 10 minutes? Round or truncate to 3 decimal places.

gained $19 + 2\pi$ People

(25.283)

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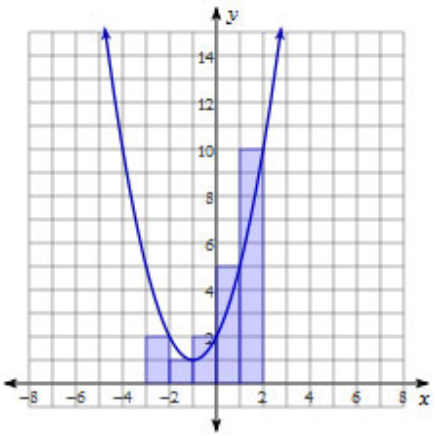
3. The graph shows which of the following?



(A) Left Riemann Sum with 5 subintervals

(B) Right Riemann Sum with 5 subintervals

(C) Midpoint Riemann Sum with 5 subintervals

(D) Trapezoidal Approximation with 5 subintervals

(E) None of the above

4. Use a **Left**-Riemann sum with 4 subintervals to approximate the integral based of the values in the table.

$$\int_0^{10} f(x)\,dx$$

x	0	4	6	7	10
$f(x)$	3	2	4	5	7

$4(3) + 2(2) + 1(4) + 3(5)$

$12 + 4 + 4 + 15$

35

5. Use a Trapezoidal approximation with 4 subintervals to approximate the area under $f(x) = \frac{1}{4}x^2 - 2x + 6$ on $[-3,0]$

$\text{width} = \frac{0--3}{4} = \frac{3}{4} = 0.75$

$\frac{3}{4}\left(\frac{f(-3)+f(-2.25)}{2}\right) + \frac{3}{4}\left(\frac{f(-2.25)+f(-1.5)}{2}\right) + \frac{3}{4}\left(\frac{f(-1.5)+f(-0.75)}{2}\right) + \frac{3}{4}\left(\frac{f(-0.75)+f(0)}{2}\right)$

$\frac{3}{4}(13.0078125) + \frac{3}{4}(10.6640625) + \frac{3}{4}(8.6015625) + \frac{3}{4}(6.8203125)$

29.320

6. Write a definite integral that is equivalent to $\lim_{n\to\infty} \sum_{k=1}^{n} \left(\frac{3}{n}\right)\left(-2 + \frac{3k}{n}\right)^4$. The lower limit for the integral is -2.

$$\int_{-2}^{1} x^4\,dx$$

Find $F'(x)$.

7. $F(x) = \int_0^{\cos x} t^2\,dt$

$(\cos x)^2 \cdot (-\sin x)$

$-\sin x \cos^2 x$

8. $F(x) = \int_{x^2}^{8-x} (2t+5)\,dt$

$[2(8-x)+5](-1) - [2(x^2)+5](2x)$

$(16-2x+5)(-1) - 4x^3 - 10x$

$-16+2x-5-4x^3-10x$

$-4x^3 - 8x - 21$