

UNIT 4: Application of Derivatives - Quiz

Name Answer Key PER _____ DATE _____

13.0	15.0

Computation

4	3	2	1
Response has no recall errors, <i>minimal</i> procedural errors* and no conceptual errors**	Response has no recall errors, minimal procedural errors and <i>minimal</i> conceptual errors	Response has no recall errors, but has several procedural errors <u>OR</u> several conceptual errors	Recall errors exist <u>OR</u> Steps taken are not related to problem <u>OR</u> Response left blank

Written Responses

4	3	2	1
Response is written in a complete sentence and uses appropriate academic vocab	Response is written in a complete sentence, and minimal errors exist in use of academic vocab	Response is not written in a complete sentence <u>OR</u> no academic vocab	Concept of response is not related to problem <u>OR</u> Response is left blank

***Procedural errors** are mistakes made in the math

****Conceptual errors** are mistakes made in the steps one take

BOX YOUR ANSWERS!!!

1. (13.0) Show your work and circle your answer.

x	2	5	10	14
$f(x)$	12	28	34	30

1. The function f is continuous on the closed interval $[2, 14]$ and has values as shown in the table above. Using the subintervals $[2, 5]$, $[5, 10]$, and $[10, 14]$, what is the approximation of $\int_2^{14} f(x) dx$ found by using a right Riemann sum?

(A) 296

(B) 312

(C) 343

(D) 374

(E) 390

$$\begin{aligned} \int_2^{14} f(x) dx &= 3(28) + 5(34) + 4(30) \\ &= 84 + 170 + 120 \\ &= 374 \end{aligned}$$

2. (13.0) Show your work and circle your answer.

x	0	2	4	6
$f(x)$	4	k	8	12

8. The function f is continuous on the closed interval $[0, 6]$ and has the values given in the table above. The trapezoidal approximation for $\int_0^6 f(x) dx$ found with 3 subintervals of equal length is 52. What is the value of k ?

(A) 2

(B) 6

(C) 7

(D) 10

(E) 14

$$\int_0^6 f(x) dx = 52$$

$$\frac{1}{2}(2)(4+k) + \frac{1}{2}(2)(k+8) + \frac{1}{2}(2)(8+12) = 52$$

$$\frac{1}{2}(2)(4+k+k+8+8+12) = 52$$

$$4 + 2k + 28 = 52$$

$$2k + 32 = 52$$

$$-32 \quad -32$$

$$2k = 20$$

$$k = 10$$

3. (13.0) Show work and box your answer. Also, be sure to answer the second question in the space provided.

2004 AB 3 BC 3 (Form B)

t (minutes)	0	5	10	15	20	25	30	35	40
$v(t)$ (miles per minute)	7.0	9.2	9.5	7.0	4.5	2.4	2.4	4.3	7.3

A test plane flies in a straight line with positive velocity $v(t)$, in miles per minute at time t minutes, where v is a differentiable function of t . Selected values of $v(t)$ for $0 \leq t \leq 40$ are shown in the table above.

- (a) Use a midpoint Riemann sum with four subintervals of equal length and values from the table to approximate $\int_0^{40} v(t) dt$. Show the computations that lead to your answer. Using correct units, explain the meaning of $\int_0^{40} v(t) dt$ in terms of the plane's flight.

$$\begin{aligned} \int_0^{40} v(t) dt &= 10(9.2 + 7.0 + 2.4 + 4.3) \\ &= 10(22.9) \\ &= 229.0 \end{aligned}$$

also total distance since it never changed direction

$\int_0^{40} v(t) dt$ represents the total displacement of the test plane. It's moved 229 miles away from its original position.

4. (15.0) Show your work and circle the correct answer.

11. Let f be the function defined by $f(x) = \int_0^x (2t^3 - 15t^2 + 36t) dt$. On which of the following intervals is the graph of $y = f(x)$ concave down?

- (A) $(-\infty, 0)$ only
- (B) $(-\infty, 2)$
- (C) $(0, \infty)$
- (D) $(2, 3)$ only**
- (E) $(3, \infty)$ only

$f''(x) < 0$

$f'(x) = 2x^3 - 15x^2 + 36x$

$f''(x) = 6x^2 - 30x + 36$

$0 = \frac{6x^2 - 30x + 36}{6}$

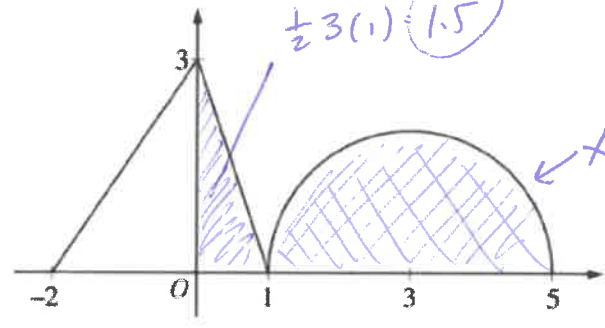
$0 = x^2 - 5x + 6 = (x-3)(x-2)$

$0 = (x-3)(x-2)$

$x=3$ $x=2$

	1	2.5	4
$f''(x)$	+	-	+

5. (15.0) Show your work and circle the correct answer.



Graph of f

76. The graph of the function f shown above consists of two line segments and a semicircle. Let g be defined by

$g(x) = \int_0^x f(t) dt$. What is the value of $g(5)$?

- (A) 0
- (B) $-1.5 + 2\pi$
- (C) 2π
- (D) $1.5 + 2\pi$**
- (E) $4.5 + 2\pi$

$g(5) = \int_0^5 f(t) dt$
Area of f from 0 to 5