Standard N02 FORM A KEY
(Finding Definite Integrals: The Basics)

APCalculus - Rentz - Content Assessment (CON) - 30 minutes

START TIME: STOP TIME:	Last Name ______________________________ Name Called By __________________________ Period: (circle one) BLUE PD 4 Class: 2019(SR) 2020(JR) 2021(SOPH) Date: _______________	**SCORE** **0 ________ 3** **/11 pts** **%**

NO CALCULATOR FOR THIS STANDARD!

Show your work!

Honor Code Reminders:
Do your own work.
No collaboration.
Use only the technology approved by the teacher for this assessment.
Do not discuss this assessment with other students prior to one week after the assessment UNLESS the teacher discusses details in class before that time.

Do your best!

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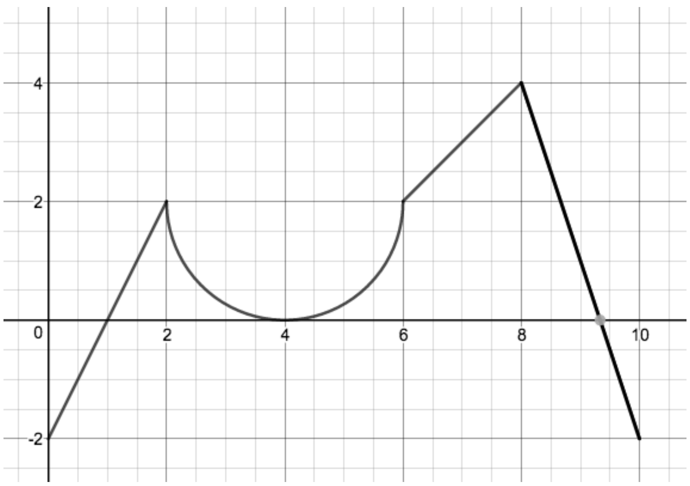
1. Use the graph of $y = f(x)$ below to find the requested values. Show work.

Note: Graph consists of a semicircle and 3 line segments.



(a) [+1 pt] $\int_0^2 f(x)dx = 0$

(b) [+1 pt] $\int_6^8 f(x)dx$

Trapezoid! (½)(2+4)(2) = 6

(c) [+1 pt] $\int_2^8 f(x)dx$

Area(rectangle) - Area(semicircle) +Trapezoid in part (b)

$= (2)(4) \quad - (1/2)(\pi (2)^2) \quad + \quad 6$

$=14 - 2\pi$

(d) [+1 pt] $\int_8^{10} f(x)dx$

Toughest one!
Equation for line is y-4 = (-3)(x-8)
x-intercept (y=0) -4 = (-3)(x-8)
-4-24 = -3x
x = 28/3 = 9 ⅓

(½)(4)(4/3)-(½)(2)(⅔) = (8/3) - (⅔) = 6/3 = 2

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2. $\int_a^b f(x)dx = 55.$
$\int_a^b g(x)dx = 20.$

Find each of the following exactly. Show work to justify results.

(a) **[+1 pt]** $\int_a^b (f(x) - g(x))dx$

$$= \int_a^b f(x)dx - \int_a^b g(x)dx$$

$$= 55 - 20 = 35$$

(b) **[+1 pt]** $\int_a^b (-2g(x))dx$

$$= -2\int_a^b g(x)dx = -2(20) = -40$$

(c) **[+1 pt]** $\int_b^a (f(x))dx$

$$= -\int_a^b f(x)dx = -(55) = -55$$

(d) **[+1 pt]** If c is any real number, $\int_a^c (g(x))dx + \int_c^b (g(x))dx.$

$$= \int_a^b g(x)dx = (20)$$

(e) **[+1 pt]** $\int_a^b (2f(x) + 3g(x))dx$

$$= 2\int_a^b f(x)dx + 3\int_a^b g(x)dx$$

$$= 2(55) + 3(20) = 110 + 60 = 170$$

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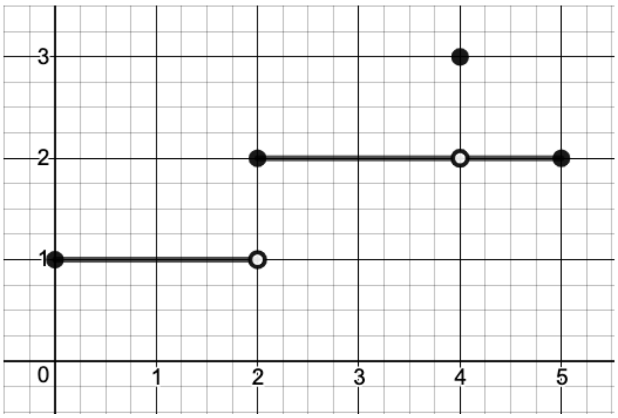
3. [+1 pt] Evaluate, using the graph of ***y* = *f(x)*** below: $\int_0^5 f(x)dx$ if it exists.

(If the definite integral does not exist, write **DNE**.)



If a "mostly" continuous function has only "jump" and "removable" discontinuities, then a definite integral can be found:

$$= \int_0^2 (1)\,dx + \int_2^4 (2)\,dx + \int_4^5 (2)\,dx$$

$$= (1)(2) + 2(2) + (2)(1) = 2 + 4 + 2 = 8$$

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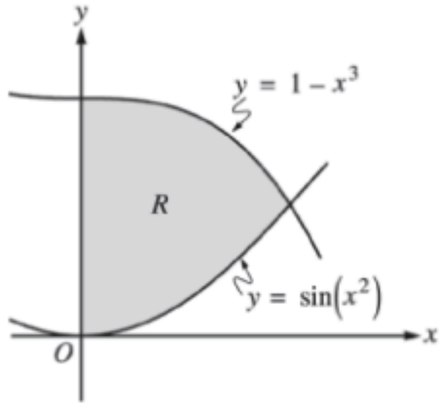
4. [+1 pt] Write the definite integral that provides the answer to the following question:
(Since you do not have access to your calculator for this assessment,
you do not need to evaluate your definite integral.)



Let R be the shaded region in the first quadrant enclosed by the y-axis and the graphs of $y = 1 - x^3$ and $y = \sin(x^2)$, as shown in the figure above.

(a) Find the area of R.

$$= \int_a^c (1 - x^3)\,dx - \int_a^c \sin(x^2)\,dx$$

If c is the first coordinate of the intersection point.