NAME: _____

42

KNOW / 12	APP / 12	INQ / 12	COMM / 6

MCV4UP - UNIT 7 – THE DEFINITE INTEGRAL

TEST

GIVE ALL ANSWERS IN EXACT FORM, UNLESS STATED OTHERWISE.

PART A – This section is to be completed without the use of a calculator. Upon completing this section, hand it in to receive the remainder of the test.

1) Evaluate each of the following. (*K – 2 marks each*)

a) $\frac{d}{dx}\int_5^x \frac{11t}{2t^3+7}dt$

b) $\int_1^3 (3x^2-4x+1)dx$

c) $\int_{-2}^{-1} \frac{2}{x^2}dx$

d) $\int_0^{\pi} (1+\cos x)dx$

e) $\frac{d}{dx}\int_{3x^2}^7 \sqrt{3t^4+t-8}dt$

f) $\frac{d}{dx}\int_{\sin x}^{\cos x} t^2 dt$

PART B – This section may be completed with the use of a calculator.

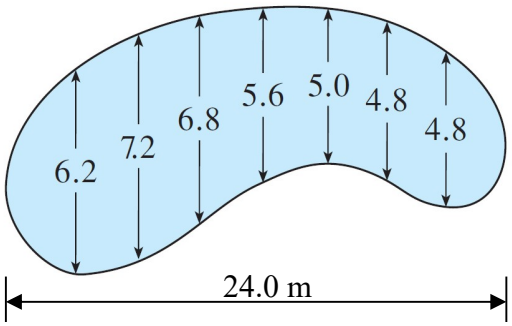
NAME: _____

2) By hand, use RRAM with 4 equal subintervals to estimate the area between the curve $f(x) = \sqrt{x} + 4$ and the x-axis on the interval $3 \le x \le 5$, to the nearest tenth. (*A – 3 marks*)

Time (s)	Velocity (m/s)
0	0
0.5	4.67
1.0	7.34
1.5	8.86
2.0	9.73
2.5	10.22
3.0	10.51

3) A radar gun was used to record the speed of a runner during the first 3 seconds of a race, as shown in the table to the left. Use the Trapezoidal Rule to estimate the distance the runner covered during those 3 seconds, to the nearest tenth. (*A – 3 marks*)

4) The widths (in metres) of a kidney-shaped swimming pool were measured as indicated in the figure on the right. Use Simpson's Rules to estimate the area of the pool's surface to the nearest tenth. (*A – 3 marks*)



5) The linear density in a rod 8 m long is $\frac{12}{\sqrt{x+1}}$ kg/m, where x is measured in metres from one end of the rod. Without using a calculator program, determine the average density of the rod. (*A – 3 marks*)

6) A sphere is created by rotating a circle with equation $x^2 + y^2 = 36$ around the x-axis. In order to create a hemisphere, only the positive x-values are used.

a) Without the use of a calculator program, use LRAM with 3 equal subintervals to estimate the volume of the hemisphere to the nearest tenth. (*I – 4 marks*)

b) If using a calculator program to estimate the volume of the hemisphere, what function should be entered into the calculator? (*I – 1 mark*)

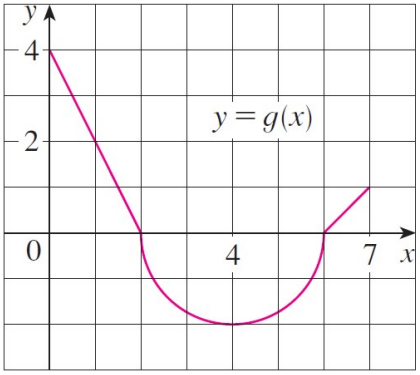
c) Using a calculator program to compute MRAM with 100 subintervals, estimate the volume of the hemisphere to the nearest tenth. (*I – 1 mark*)

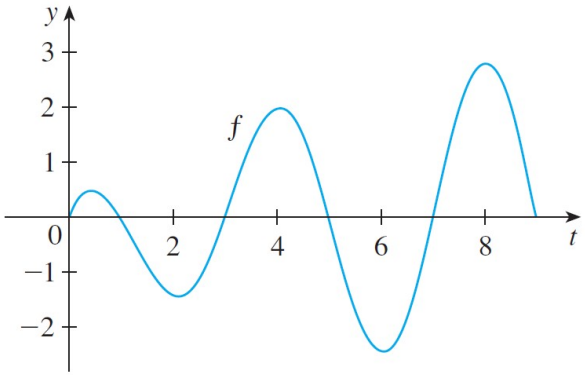
7) Determine, to the nearest tenth, the total area between the curve $f(x) = -6x^2 + 54$ and the x-axis on the interval [1, 5]. Show all work leading to the final answer. (*I – 3 marks*)

8) Use a calculator program to evaluate $\int_{-1}^{10} \frac{x^2 - 3}{7x + 8} dx$ to the nearest tenth. (*I – 1 mark*)

9) Without using a calculator's integration function, evaluate $\int_{3}^{7} \frac{10x}{x^2 + 3} dx$ to the nearest tenth. Show all work leading to the final answer. (*I – 2 marks*)

10) The graph of $y = g(x)$ shown on the right consists of two straight lines and a semicircle. Use the graph to evaluate $\int_0^7 g(x)dx$ to the nearest tenth. (*C – 2 marks*)





11) Let $g(x) = \int_0^x f(t)dt$, where f is the function whose graph is show on the left.

a) On what intervals is $g(x)$ decreasing? (*C – 1 mark*)

b) Is $g(3)$ positive or negative? (*C – 1 mark*)

12) Let $f(x) = 3x^2 - 4$.

a) What value does the Mean Value Theorem for Definite Integrals guarantee that $f(x)$ will equal on the interval [0, 4]? (*C – 1 mark*)

b) At what x-value does the function assume the value found in part (a)? Express your answer in exact form. (*C – 1 mark*)