

Solomon Practice Paper

Pure Mathematics 2L

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

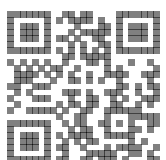
Question	Points	Score
1	5	
2	6	
3	7	
4	9	
5	9	
6	12	
7	12	
8	15	
Total:	75	

How I can achieve better:

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Last updated: May 5, 2023



1. (a) Sketch the following graphs on separate diagrams, labelling the coordinates of any points where each graph meets the coordinate axes. [4]

i. $y = |x + 1|$.

ii. $y = |x| + 1$.

(b) Hence, write down the set of values of x for which [1]

$$|x| + 1 > |x + 1|.$$

Total: 5

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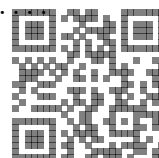
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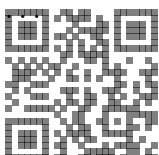
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- 2. (a) Prove by counter-example that $a > b$ does not imply that $(a + 1)^2 > (b + 1)^2$ for all integers a and b . [2]
- (b) Use proof by contradiction to show that $(4n - 3)$ is odd for all positive integers n . [4]

Total: 6

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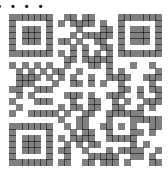
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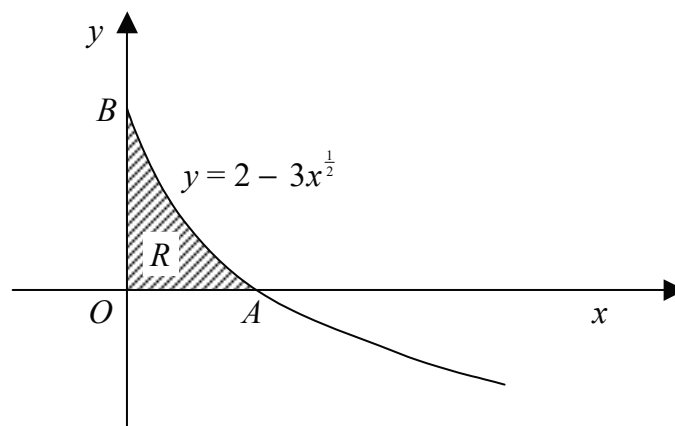
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6. Figure shows the curve with equation $y = 2 - 3x^{\frac{1}{2}}$.



The curve meets the x -axis at the point A and the y -axis at the point B .

(a) Find the coordinates of the points A and B . [3]

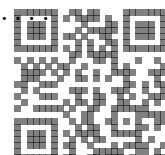
The shaded region, R , is bounded by the curve and the positive coordinate axes.

(b) Show that the volume generated when R is rotated through 360° about the x -axis is $\frac{8}{27}\pi$. [7]

(c) State, with a reason, whether the volume generated when R is rotated through 360° about the y -axis is more, less or the same as your answer to part (b). [2]

Total: 12

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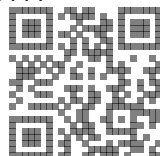
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7.

$$f(x) \equiv \arccos(x), \quad x \in \mathbb{R}, \quad |x| \leq 1.$$

- (a) State the exact value of x for which $f(x) = \frac{3}{4}\pi$. [2]
- (b) Sketch the curve $y = f(x)$ and state its range. [3]
- (c) Use the trapezium rule with 3 equally spaced ordinates to estimate the area enclosed by the curve $y = f(x)$ and the positive coordinate axes. Give your answer in the form $k\pi$ where k is an exact fraction. [5]
- (d) Explain, with reference to the curve's symmetry, why the total area enclosed by the curve, the x -axis and the ordinate $x = -1$ is π . [2]

Total: 12

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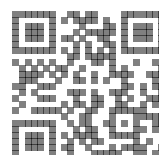
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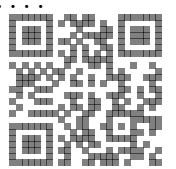
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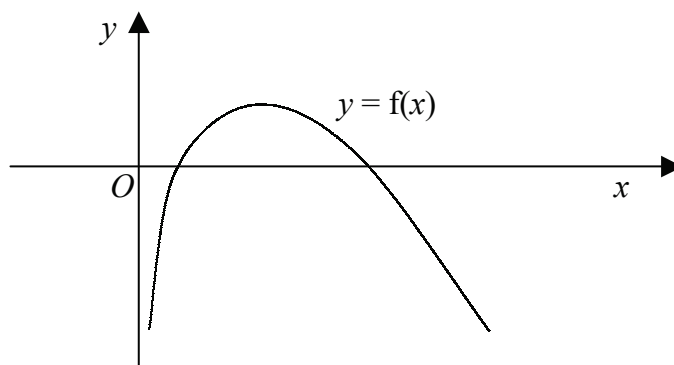
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8. Figure shows the curve $y = f(x)$ where $f(x) \equiv \ln(5x) - 2x^2, x > 0$.



(a) Show that the maximum value of $f(x)$ is $\ln\left(\frac{5}{2}\right) - \frac{1}{2}$. [5]

The point A lies on the curve and has x -coordinate $\frac{1}{5}$.

(b) Show that the equation of the tangent to the curve at A is $105x - 25y - 23 = 0$. [5]

(c) Show that the equation $f(x) = 0$ can be rearranged to give $x = \frac{1}{4} (e^{2x^2} - x)$. [2]

(d) Use the iteration formula [3]

$$x_{n+1} = \frac{1}{4} (e^{2x_n^2} - x)$$

with $x_0 = 0.25$ to find x_1, x_2 and x_3 .

Hence, write down one root of the equation $f(x) = 0$ correct to an appropriate degree of accuracy.

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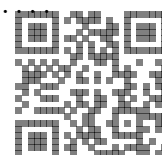
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