

# Solomon Practice Paper

## Core Mathematics 4E

**Time allowed: 90 minutes**

**Centre:** [www.CasperYC.club](http://www.CasperYC.club)

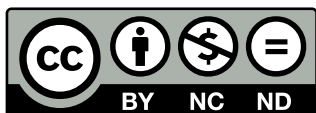
**Name:**

**Teacher:**

Question	Points	Score
1	4	
2	8	
3	9	
4	9	
5	10	
6	10	
7	12	
8	13	
Total:	75	

**How I can achieve better:**

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June 17, 2025

[4]

$$\int \cot^2(2x) \, dx.$$

$$4 \cos(x) + 2 \sin(y) = 3.$$

[5]

(b) Find an equation for the tangent to the curve at the point  $(\frac{\pi}{3}, \frac{\pi}{6})$ , giving your answer in the form  $ax + by = c$ , where  $a$  and  $b$  are integers.

[3]

3. (a) Express

$$\frac{2 + 20x}{1 + 2x - 8x^2}$$

[4]

as a sum of partial fractions.

(b) Hence find the series expansion of

[5]

$$\frac{2 + 20x}{1 + 2x - 8x^2}, \quad |x| < \frac{1}{4},$$

in ascending powers of  $x$  up to and including the term in  $x^3$ , simplifying each coefficient.

Total: 9

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- (a) Find a vector equation for  $l_1$ .

$$\mathbf{r} = (6\mathbf{i} + a\mathbf{j} + b\mathbf{k}) + \mu(\mathbf{i} + 4\mathbf{j} - \mathbf{k})$$

(b) Find the values of the constants  $a$  and  $b$ .

- (c) Find, in degrees to 1 decimal place, the acute angle between lines  $l_1$  and  $l_2$ .

Total: 9

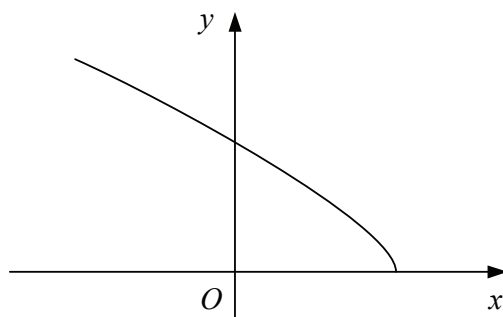
$$\frac{dy}{dt} = -ke^{-0.2t},$$

(a) Find an expression for  $y$  in terms of  $k$  and  $t$ . [4]

(b) find the value of  $k$  to 4 significant figures. [3]

(c) show that  $h = 79$  to 2 significant figures. [3]

Total: 10

$$x = 2 - t^2, \quad \text{and} \quad y = t(t + 1), \quad t \geq 0.$$


- (a) Find the coordinates of the points where the curve meets the coordinate axes. [4]
- (b) Find the exact area of the region bounded by the curve and the coordinate axes. [6]

Total: 10

[3]

$$\frac{d}{dx}a^x = a^x \ln(a).$$

A curve has the equation  $4^x - 2^{x-1} + 1$ .

[5]

$$3x \ln(2) - 2y + 3 = 0.$$

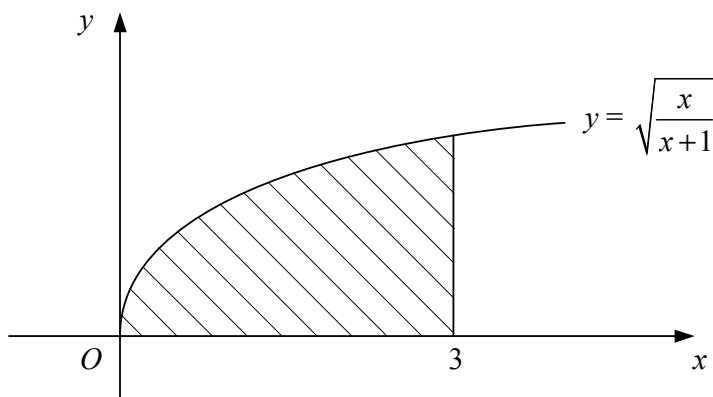
[4]

Total: 12



8. Figure shows the curve with equation

$$y = \sqrt{\frac{x}{x+1}}.$$



The shaded region is bounded by the curve, the  $x$ -axis and the line  $x = 3$ .

- (a) i. Use the trapezium rule with three strips to find an estimate for the area of the shaded region. [7]
- ii. Use the trapezium rule with six strips to find an improved estimate for the area of the shaded region.

The shaded region is rotated through  $2\pi$  radians about the  $x$ -axis.

- (b) Show that the volume of the solid formed is  $\pi(3 - \ln(4))$ . [6]

Total: 13

