Provident

MM · T1 · SEP · 2026 (A)

CALCULATOR FREE

SPECIMEN

Copyright © 2026 Provident Marking Proprietary Limited

Question 1 (3 marks)

a. Let $y = e^{e^x}$.

Find $\dfrac{dy}{dx}$. 1 mark

b. Let $f(x) = \dfrac{x}{\cos(x)}$.

Find $f'(\pi)$. 2 marks

SPECIMEN

Complete under exam conditions.

Question 2 (5 marks)

Let $f(x) = x\log_e(x)$, where $x > 0$.

a. Find $f'(x)$. 1 mark

b. Find the coordinates of the stationary point of the graph of $f(x)$. 1 mark

c. Find the equation of the tangent to the graph of $f(x)$ that is parallel to the line $y = 3x - 1$.
Give your answer in the form $y = mx + c$. 3 marks

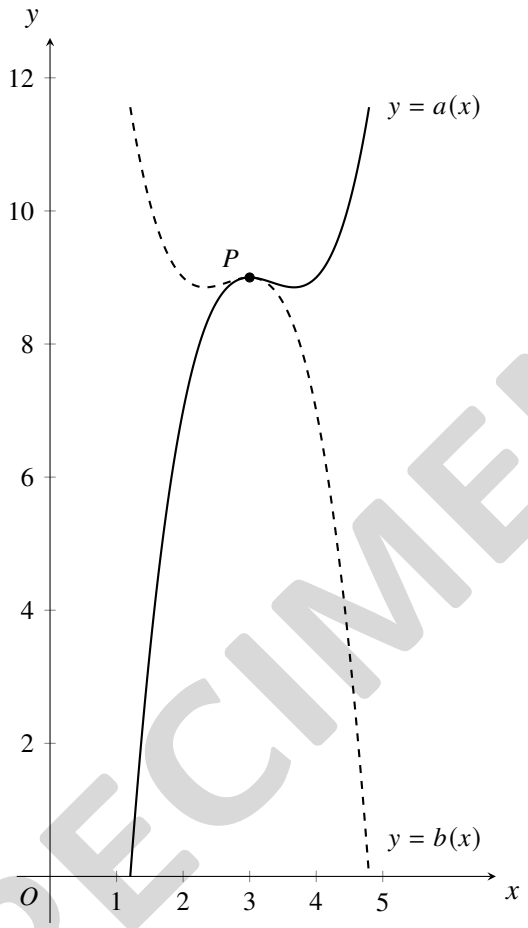
SPECIMEN

Read for 10 minutes.

Question 3 (5 marks)

Let $a(x) = x^3 - 10x^2 + 33x - 27$ and $b(x) = -x^3 + 8x^2 - 21x + 27$.

Part of each graph is shown below. The graphs meet at the point $P(3, 9)$.



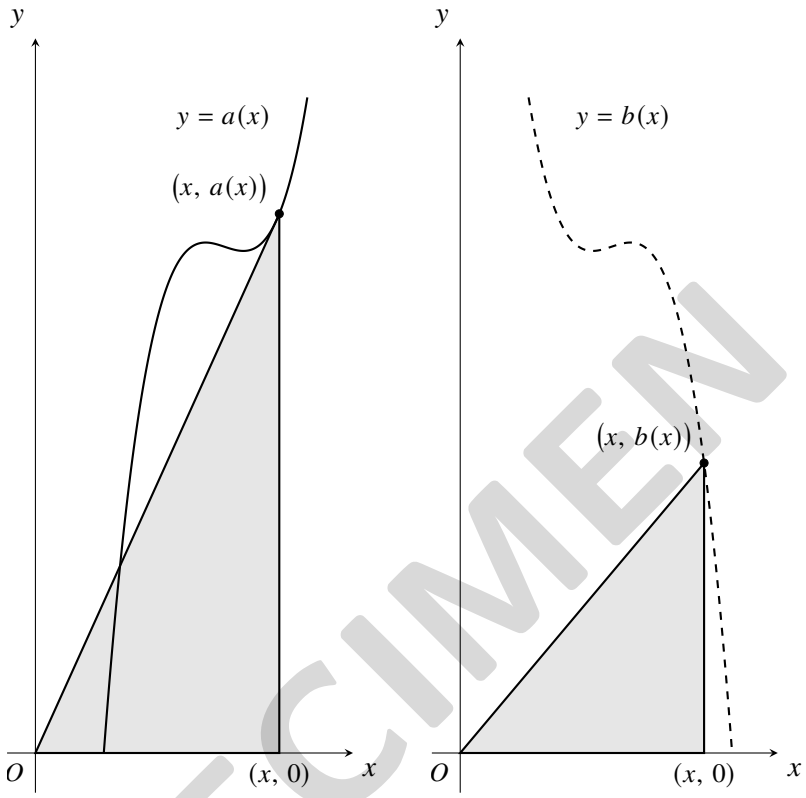
a. Show that the graphs of $y = a(x)$ and $y = b(x)$ have equal gradient at P. 2 marks

SPECIMEN

This test has 4 questions.

b. For $x \in [\,2,\ 4.5\,]$, two triangles are formed:

- one with vertices at the origin, $(x,\ 0)$ and $\big(x,\ a(x)\big)$
- one with vertices at the origin, $(x,\ 0)$ and $\big(x,\ b(x)\big)$



Find the maximum value of the sum of the total areas of the two triangles. 3 marks

SPECIMEN

Write for 30 minutes.

Question 4 (7 marks)

Let $f(x) = \dfrac{x + e}{e^x}$, where $x \in [-2, 1]$.

a. Find $f'(x)$. 1 mark

b. Find the range of f' over the interval $[-1, 1]$. 3 marks

SPECIMEN

Complete under exam conditions.

c. You may use the following facts:

$$f(-2) = (e-2)e^2 \approx 5.31, \qquad f(1) = 1 + \tfrac{1}{e} \approx 1.37, \qquad \max f = e^{e-1} \approx 5.57.$$

Find the number of turning points the graph of $y = \cos\big(f(x)\big)$ has for $x \in [-2,\ 1]$. 3 marks

SPECIMEN

END OF TEST

Clear photos, clean transcripts.