

Please stick the barcode label here.

2. Let $P(x) = \begin{vmatrix} x+\lambda & 1 & 2 \\ 0 & (x+\lambda)^2 & 3 \\ 4 & 5 & (x+\lambda)^3 \end{vmatrix}$, where $\lambda \in \mathbf{R}$. It is given that the coefficient of x^3 in the expansion of $P(x)$ is 160. Find

(a) λ ,

(b) $P'(0)$.

(5 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

3. A researcher performs an experiment to study the rate of change of the volume of liquid X in a vessel. The experiment lasts for 24 hours. At the start of the experiment, the vessel contains 580 cm^3 of liquid X . The researcher finds that during the experiment, $\frac{dV}{dt} = -2t$, where $V \text{ cm}^3$ is the volume of liquid X in the vessel and t is the number of hours elapsed since the start of the experiment.

(a) The researcher claims that the vessel contains some liquid X at the end of the experiment. Is the claim correct? Explain your answer.

(b) It is given that $V = h^2 + 24h$, where $h \text{ cm}$ is the depth of liquid X in the vessel. Find the value of $\frac{dh}{dt}$ when $t = 18$.

(6 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

Answers written in the margins will not be marked.

A large rectangular area with horizontal ruling lines for writing answers. The lines are evenly spaced and cover most of the page's width.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

Answers written in the margins will not be marked.

A large rectangular area with horizontal lines for writing answers. The lines are evenly spaced and cover most of the page's width. There are approximately 25 lines in total.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

A large rectangular area with horizontal ruling lines, intended for writing answers. The lines are evenly spaced and cover most of the page's width.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

A large rectangular area with horizontal ruling lines, intended for writing answers. The lines are evenly spaced and run across the width of the page.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

A large rectangular area with horizontal ruling lines, intended for student answers. The lines are evenly spaced and cover the majority of the page's width and height.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

A large rectangular area with horizontal ruling lines, intended for student answers. The lines are evenly spaced and run across the width of the page.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

A large rectangular area with horizontal ruling lines, intended for writing answers. The lines are evenly spaced and run across the width of the page.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

A large rectangular area with horizontal ruling lines, intended for writing answers. The lines are evenly spaced and cover most of the page's width and height.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

A large rectangular area with horizontal ruling lines, intended for student answers. The lines are evenly spaced and cover the majority of the page's width and height.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

