Question 2 (6 marks)

(a) Determine when . (3 marks)

(b) Determine the slope of the curve with equation at the point .

(3 marks)

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(a) Determine when . (3 marks)

|  |
| --- |
| Solution |
|  |
| Specific behaviours |
| ✓ correctly differentiates term  ü correctly differentiates term  ü obtains correct derivative |

(b) Determine the slope of the curve with equation at the point .

(3 marks)

|  |
| --- |
| Solution |
| Slope of curve is . |
| Specific behaviours |
| ✓ correctly differentiates term  ü correctly substitutes  ü correct slope |

Question 5 (7 marks)

A small body moving in a straight line is initially at the origin . seconds later the body has displacement metres and velocity metres per second relative to so that .

(a) Determine the initial acceleration of the body. (2 marks)

(b) Determine the displacement of the body as a function of time. (3 marks)

(c) Determine the velocity of the body after seconds. (2 marks)

Question 5 (7 marks)

A small body moving in a straight line is initially at the origin . seconds later the body has displacement metres and velocity metres per second relative to so that .

(a) Determine the initial acceleration of the body. (2 marks)

|  |
| --- |
| Solution |
|  |
| Specific behaviours |
| ✓ obtains correct expression for  ü correct initial acceleration |

(b) Determine the displacement of the body as a function of time. (3 marks)

|  |
| --- |
| Solution |
|  |
| Specific behaviours |
| ✓ formulates differential equation and separates variables  ü antidifferentiates, evaluates constant  ü correct displacement function |

(c) Determine the velocity of the body after seconds. (2 marks)

|  |
| --- |
| Alternative Solution |
|  |
| Specific behaviours |
| ✓ indicates appropriate method  ü correct velocity |

|  |
| --- |
| Solution |
|  |
| Specific behaviours |
| ✓ indicates appropriate method  ü correct velocity |

Question 6 (7 marks)

A particle leaves the origin at time with initial velocity and moves in a straight line with acceleration given by

where is its velocity and is its displacement from the origin at time , .

(a) Determine an equation for as a function of . (4 marks)

(b) Determine an equation for as a function of time . (3 marks)

Question 6 (7 marks)

A particle leaves the origin at time with initial velocity and moves in a straight line with acceleration given by

where is its velocity and is its displacement from the origin at time , .

(a) Determine an equation for as a function of . (4 marks)

|  |
| --- |
| **Solution** |
|  |
| **Specific behaviours** |
| ✓ integrates both sides   determines constant of integration   simplifies and factorises   clearly considers root |

(b) Determine an equation for as a function of time . (3 marks)

|  |
| --- |
| **Solution** |
|  |
| **Specific behaviours** |
| ✓ separates variables and integrates   eliminates logs and evaluates constant   writes expression |