QUESTION 7.3

(a) $x = 0$ ***(A1)(A1)*** ***[2 marks]***

Notes: Award ***(A1)*** for $x =$ constant, ***(A1)*** for 0. Award ***(A0)(A0)*** if answer is not an equation.

(b) $b - \frac{2}{x^3}$ ***(A1)(A1)(A1)*** ***[3 marks]***

Note: Award ***(A1)*** for b, ***(A1)*** for -2, ***(A1)*** for $\frac{1}{x^3}$ (or x^{-3}).
Award at most ***(A1)(A1)(A0)*** if extra terms seen.

(c) $3 = b - \frac{2}{(1)^3}$ ***(M1)(M1)***

Note: Award ***(M1)*** for substituting 1 into their gradient function, ***(M1)*** for equating their gradient function to 3.

$b = 5$ ***(AG)*** ***[2 marks]***

Note: Award at most ***(M1)(A0)*** if final line is not seen or b does not equal 5.

(d) $g(1) = 3$ **or** $(1, 3)$ *(seen or implied from the line below)* ***(A1)***

$3 = 3 \times 1 + c$ ***(M1)***

Note: Award ***(M1)*** for correct substitution of their point $(1, 3)$ and gradient 3 into equation $y = mx + c$. Follow through from their point of tangency.

$y = 3x$ ***(A1)*(ft)*(G2)***

OR

$y - 3 = 3(x - 1)$ ***(M1)(A1)*(ft)*(G2)*** ***[3 marks]***

Note: Award ***(M1)*** for substitution of gradient 3 and their point $(1, 3)$ into $y - y_1 = m(x - x_1)$, ***(A1)*(ft)*** for correct substitutions. Follow through from their point of tangency. Award at most ***(A1)(M1)(A0)*(ft)*** if further incorrect working seen.

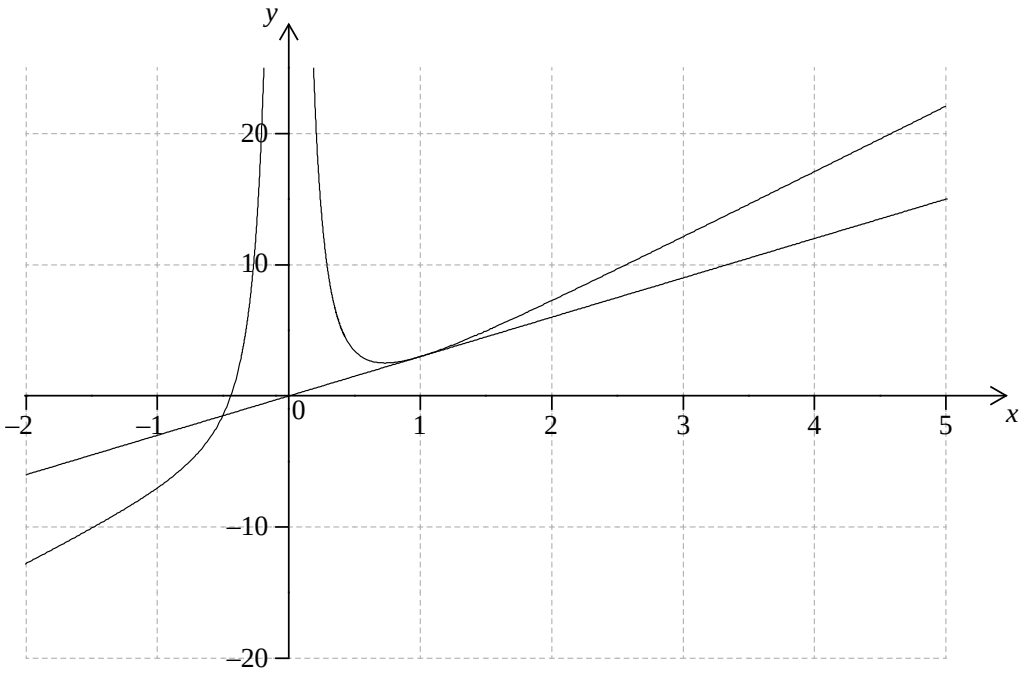
(e) $(-0.439, 0)$ $\left((-0.438785\ldots, 0)\right)$ ***(G1)(G1)*** ***[2 marks]***

Notes: If no parentheses award at most ***(G1)(G0)***.
Accept $x = -0.439$, $y = 0$.

continued…

Question 7.3 continued

(f) (i)



Award ***(A1)*** for labels and some indication of scale in the stated window.
Award ***(A1)*** for correct general shape (curve must be smooth and must not cross the *y*-axis)
Award ***(A1)*(ft)** for *x*-intercept consistent with their part (e).
Award ***(A1)*** for local minimum in the first quadrant. ***(A1)(A1)(A1)*(ft)*(A1)**

(ii) Tangent to curve drawn at approximately $x = 1$ ***(A1)(A1)*** ***[6 marks]***

Note: Award ***(A1)*** for a line tangent to curve approximately at $x = 1$.
Must be a straight line for the mark to be awarded.
Award ***(A1)*(ft)** for line passing through the origin. Follow through from their answer to part (d).

(g) $(0.737, 2.53)$ $((0.736806\ldots, 2.52604\ldots))$ ***(G1)(G1)*** ***[2 marks]***

Notes: Do not penalize for lack of parentheses if already penalized in (e).
Accept $x = 0.737$, $y = 2.53$.

(h) $0.737 < x < 5$ **OR** $(0.737; 5)$ ***(A1)(A1)*(ft)** ***[2 marks]***

Notes: Award ***(A1)*** for correct strict or weak inequalities with *x* seen if the interval is given as inequalities, ***(A1)*(ft)** for 0.737 and 5 or their value from part (g).

Total ***[22 marks]***