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The numbers between brackets in the margin represent the marks assigned to the question. The maximum grade is 50.

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1. For the following functions, find the derivative  $f'(x)$  at the points  $x$  where  $f$  is differentiable. Simplify your answer as much as possible.

- (9) (a)  $f(x) = \arcsin(3x^2)$ .
- (9) (b)  $f(x) = \arctan \frac{x+1}{x-1}$ .
- (9) (c)  $f(x) = \sin^{-1}(3x) \cos^{-1}(3x)$ .
- (9) (d)  $f(x) = \tan^{-1}(\sin^{-1} x)$ .

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2. Let  $y = f(x) = -x^3 - x + 2$ . The given function is invertible and we denote its inverse by  $f^{-1}$ .

- (5) (a) Does the point  $P(-8, 2)$  belong to the graph of  $f^{-1}$ ? why?
- (9) (b) Find the equation of the tangent line to the graph of  $f^{-1}$  at the point  $P(-8, 2)$ .

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**TOTAL MARKS: 50**