

Books, watches, notes or cell phones are not allowed. The only calculators allowed are the Sharp EL-531**. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. (1 mark each) Differentiate the following functions:

a.

$$f(x) = \frac{1}{x^{3/7}} = x^{-3/7} \quad f'(x) = -\frac{3}{7} x^{-10/7}$$

b.

$$f(x) = \operatorname{arccsc} x \quad f'(x) = \frac{-1}{x\sqrt{x^2-1}}$$

c.

$$f(x) = \cot x \quad f'(x) = -\csc^2 x$$

d.

$$f(x) = \ln x \quad f'(x) = \frac{1}{x}$$

e.

$$f(x) = \sec x \quad f'(x) = \sec x \tan x$$

f.

$$f(x) = \operatorname{arcsec} x \quad f'(x) = \frac{1}{x\sqrt{x^2-1}}$$

Question 2. (2 marks) Differentiate the following functions (do not simplify):

$$f(x) = (x) \csc(\arctan 3x)$$

$$f'(x) = \sec(\arctan 3x) + x(\csc(\arctan 3x) \cot(\arctan 3x)) \frac{1}{1+(3x)^2} \cdot 3$$

Question 3. (2 marks) Differentiate the following functions (do not simplify):

$$f(x) = \frac{e^{2x}}{\cos 3x}$$

$$f'(x) = \frac{e^{2x} \cdot 2 \cdot \cos 3x - e^{2x} (-\sin 3x) \cdot 3}{(\cos 3x)^2}$$