

Name: _____
Student ID: _____

Test 2

This test is graded out of 43 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. Compute the derivative of the following functions (*1 mark each*):

a.

$$f(x) = \sin x$$

b.

$$f(x) = \cos x$$

c.

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

d.

$$f(x) = \sec x$$

e.

$$f(x) = \tan x$$

f.

$$f(x) = \cot x$$

g.

$$f(x) = \arcsin x$$

h.

$$f(x) = \arccos x$$

i.

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

j.

$$f(x) = \ln x$$

k.

$$f(x) = e^x$$

Question 2. Compute the derivative of the following functions. (*Do not simplify.*)

a. (3 marks)

$$g(t) = te^{\arctan 5t}$$

b. (3 marks)

$$z(x) = (\csc 4x)(\tan 3x)$$

c. (3 marks)

$$h(z) = \ln [(z+2)^2(3z+1)^3]$$

Question 3. Compute the derivative of the following functions. (*Do not simplify.*)

a. (3 marks)

$$f(x) = \frac{e^{\pi x} + 1}{\cos \pi x}$$

b. (3 marks)

$$g(z) = \sqrt{\arcsin(\ln(\sin 3x))}$$

c. (3 marks)

$$s(t) = ((\sec x) \ln(\cos x))^7$$

Question 4. (5 marks) Find the equation of the normal to the curve $y = \arctan(\ln x)$ at $x = 1$.

Question 5. (4 marks) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for the relation

$$\ln(xy) = x^2$$

Question 6. (5 marks) Find a root of $x^3 + 2x^2 - x - 1 = 0$ to at least four decimal places by using Newton's Method and let $x_0 = 0.8$.

Bonus. (3 marks) Find the derivative of $y = \operatorname{arcsec} x$ (hint: use implicit differentiation).