
M1M1: Progress Test 2: November 18th 2005

Write your name **clearly** on your answer book.

No calculators. No books/lecture notes.

50 minutes. Attempt all four questions.

1. Find the derivatives of the following two functions *from first principles* (i.e., using the definition of the derivative as a limit):

(a) $\exp(x^2)$;

(b) $(1 + x^2)^{1/2}$.

2. Find the derivatives, using any method, of the following functions:

(a) $(1 + \cos x)^{1/3}$;

(b) $(\cos x)^x$;

(c) $\cos(\sin^{-1}(x))$.

3. Find an explicit expression for

$$\frac{d^{10}}{dx^{10}} \left(\frac{x^3}{(1+x)} \right)$$

(i.e., the *tenth* derivative of this function).

4. Sketch the curve

$$y^2 = x^2(1 - x^2),$$

carefully indicating any special features on your sketch.

THE END