

## CALCULUS II, H21, TEST 1

Name: \_\_\_\_\_

Student number \_\_\_\_\_

(1) (1.5 marks) Determine  $f(x)$  if

$$f''(x) = \frac{1}{\sqrt[3]{x^2}}$$

and  $f'(1) = -1, f(1) = 2$ .

- (2) (1.5 marks) Use the definition of the integral as a limit of a sum to evaluate the integral

$$\int_0^3 x^2(2x - 1) \, dx$$

- (3) (1.5 marks) Determine a function  $f$  and a number  $a$  such that

$$\int_x^a f(t) \, dt = -2^x + 4$$

for all  $x > 0$ .

- (4) (1.5 marks) Determine the derivative of the following function

$$g(x) = \int_{x^2}^{e^{-x}} \sqrt{1+t^2} \, dt$$

(5) (1 mark) Determine the integral

$$\int_1^4 \frac{3x^{5/2} - 8}{2x^2} dx$$

(6) (1 mark) Determine the integral

$$\int_0^1 \frac{4^x}{3^{x+1}} dx$$

(7) (1 mark) Determine the integral

$$\int_0^3 (x-1)e^{-(x-1)^2/2} dx$$

(8) (1 mark) Determine the integral

$$\int_0^3 |x^2 - 2x| dx$$

(9) (1 mark) Evaluate the indefinite integral

$$\int \sin^3 x \cos^3 x \, dx$$

(10) (1 mark) Evaluate the indefinite integral

$$\int \frac{1}{4 + e^{-z}} \, dz$$

- (11) (1.5 marks) Sketch the region bounded by the given curves, then find its area:  
 $y = 4 \cos x$ ,  $y = 3 \sin x$ ,  $x = 0$ .

- (12) (1.5 marks) Sketch the region bounded by the given curves, then find its area:  
 $y = \sqrt{x}$ ,  $y = x - 2$ ,  $y = 0$ .