

CONCORDIA UNIVERSITY  
Department of Mathematics & Statistics

<b>Course</b>	<b>Number</b>	<b>Sections</b>
Mathematics	205	All
<b>Examination</b>	<b>Date</b>	<b>Pages</b>
Final	April 2012	2
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<b>Special Instructions:</b>	Only calculators approved by the Department are allowed. For full marks show your work clearly.	

MARKS

- [10] 1. (a) Write in sigma notation the formula for the right Riemann sum  $R_n$  of  $f(x) = 3 + 2x^2$  on the interval  $[0,3]$  partitioned into  $n$  subintervals of equal length, and calculate  $R_6$  to approximate the area enclosed by the graph of  $f$  and  $x$ - axis on that interval by the sum with  $n = 6$ .

NOTE: you may need the formula  $\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$ .

- (b) Use the Fundamental Theorem of Calculus to calculate the derivative of the function  $F(x) = \int_0^{x^2} \frac{t-4}{1+\cos^2(t)} dt$ , and find the points  $x$  of the local extrema (maximum or minimum) of  $F$ .

- [8] 2. Find the antiderivative  $F(x)$  of the function  $f(x)$  that satisfies the given condition:

(a)  $f(x) = \sqrt{x}(1-x^{-1/2})^2$ ,  $F(1) = 1$ .      (b)  $f(x) = \frac{5 + \cos^2(x)}{\cos^2(x)}$ ,  $F(0) = 5$ .

- [12] 3. Calculate the following indefinite integrals:

(a)  $\int \frac{\sin(x)}{\cos^2(x) + 9} dx$ ,      (b)  $\int \frac{2^x}{2^x + 1} dx$ ,      (c)  $\int \frac{dx}{(x+4)(x-1)}$ .

- [10] 4. Evaluate the following definite integrals (give the exact answers):

(a)  $\int_0^4 \frac{t}{\sqrt{1+2t}} dt$       (b)  $\int_1^4 \sqrt{t} \ln(t) dt$