

CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number	Sections
Mathematics	201	All
Examination	Date	Duration
Midterm	20 October, 2013	1 h 30 min
Special Instructions:	Only approved calculators are allowed The marks for each question are indicated, with 100% = 50 marks. Show all your work.	

- [8] (a) Find the equation of the line passing through the point $(2, 1)$ and which is perpendicular to the line $3x + 2y - 5 = 0$.
(b) Write the equation of the circle $x^2 + y^2 - 6x + 8y = 0$ in the standard form. Find the radius of the circle and the distance from the center to the origin.
- [8] Given the rational function $f(x) = \frac{2x^2 - 8}{x^2 - 2x - 3}$
(a) Find the x - and y - intercepts.
(b) Find all vertical and horizontal asymptotes.
- [8] Consider the quadratic function $f(x) = -2x^2 + 2x + 4$.
(a) Express $f(x)$ in standard form.
(b) Find its vertex and indicate if it is the maximum or the minimum of f .
- [5] Consider the functions $f(x) = x^2$ and $g(x) = \sqrt{x - 4}$. Find the functions $f(x) + g(x)$, $f(g(x))$ and $g(f(x))$, and give their domains.
- [15] Find the solutions of the following equations
 - $e^{2x} = 8e^x + 20$
 - $\log_5(2x) + \log_5(x + 1) = \log_5(3x)$
 - $\log_4(x + 1) = 2 + \log_4(x - 1)$
- [6] Consider the function $f(x) = \sqrt{8 - 4x} - 2$.
 - Find the inverse function f^{-1} .
 - Find the domain and range of $f(x)$ and the domain and range of $f^{-1}(x)$.

Bonus. [3]: Assuming that today's world population is 7 billions and the continuous growth rate is 1.4% per year, estimate the world population expected in 10 years from now.