

CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number	Sections
Mathematics	201	All
Examination	Date	Duration
Midterm	5 March, 2017	1 h 30 min
Special Instructions:	Only approved calculators are allowed Show all your work for full marks	

1. [9] (a) Find the distance between the points $(12, -3)$ and $(6, 1)$.
 (b) Write the equation of the line which passes through the point $(5, -1)$ and is perpendicular to the line through $(-6, 3)$ and $(-2, -7)$.
 (c) Write the equation of the circle $x^2 + y^2 + 10y - 39 = 0$ in the standard form. Find the coordinates of the center and the radius of the circle.
2. [9] Consider the quadratic function $f(x) = -2x^2 + 2x - 8$.
 (a) Express $f(x)$ in the vertex form.
 (b) Find the coordinates of the vertex and indicate whether it corresponds to the maximum or the minimum of f .
 (c) Find the x- and y- intercepts of the graph of this function.
3. [8] Given the rational function $f(x) = \frac{2x^3 + 10x^2}{(x+6)(3x^2 + 5x - 2)}$ *x-int.*
 (a) Find the x- and y- intercepts. *y=0*
 (b) Find all the vertical and horizontal asymptotes.
- * 4. [6] Consider the functions $f(x) = \frac{2}{x-1}$ and $g(x) = \frac{2}{x}$. Find the functions $(g \circ f)(x)$ and $(f \circ g)(x)$, and determine their domains.
5. [12] Find all solutions of the following equations
 (a) $3^{x-6} = 27 \cdot 9^{x-1}$
 (b) $5^{2x} = 12 - 4 \cdot 5^x$
 (c) $2 \log_2(x) - \log_2(x+2) = -\log_2(3)$
6. [6] Consider the function $f(x) = 7 - 3\sqrt{x-4}$.
 (a) Find the inverse function f^{-1} .
 (b) Find the domain and range of $f(x)$ and the domain and range of $f^{-1}(x)$.
9. ← Bonus. [3]: Let $f(x) = 2^{2x} - 2^{x+1}$. Find the inverse of f if it exists or explain why f is not invertible.