

UNIVERSITY OF NEW BRUNSWICK
DEPARTMENT OF MATHEMATICS & STATISTICS
MATH 0863 - PRECALCULUS
FINAL EXAM - DECEMBER 2003

TIME: 3 HOURS

Circle Instructor's Name:

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MARKS

- (8) 1. Simplify each of the following. Express all answers with positive exponents.
- (a) $(5x^{-3}y^{-1})(2x^5y^6)$
 - (b) $(3x^{-2}y^3)^{-2}$
 - (c) $(3x^2y^{1/2}z^{1/3})(2x^{1/4}y^2z^3)^2$
 - (d) $\sqrt{32} - 5\sqrt{2} + \sqrt{72}$
- (6) 2. Evaluate the following expressions.
- (a) $5^0 + 8^{2/3}$
 - (b) $2^4 \cdot 4^3 \cdot 8^{-3}$
 - (c) $\log_5 125 - \log_5 25$
- (4) 3. If $f(x) = 2x^2 - 3x + 4$ and $g(x) = 3x + 7$, find:
- (a) $f(-3)$
 - (b) $g(-2)$
 - (c) $f(g(1))$
- (16) 4. Solve the following equations for x .
- (a) $\frac{1}{4}x - 3 = 6$
 - (b) $x^2 - 10x + 21 = 0$
 - (c) $2|x - 3| - 1 = 11$
 - (d) $3x^2 + 14x = 5$
 - (e) $5x^2 + 2x - 2 = 0$
 - (f) $x^2 - 2x = -5$
- (6) 5. (a) Find the equation of a line which passes through the points $(-5, 2)$ and $(4, -1)$.
(b) Find the equation of a line which passes through the point $(6, 8)$ and is perpendicular to the line $y = 2x - 3$.

(8) 6. Sketch each of the following using transformations of standard graph, show both graphs. Indicate all intercepts.

(a) $f(x) = |x + 1| - 2$

(b) $y = \sqrt{x + 4} + 2$

(c) $f(x) = \sin(x) + 1, \quad 0^\circ \leq x \leq 360^\circ$

(d) $y = 3^x - 1$

(10) 7. Solve the following equations for x .

(a) $\frac{1}{3} \log_2 x = \log_2 3$

(b) $\log_8(x + 5) + \log_8(x - 2) = 1$

(c) $2^{x+10} = 8^{3x-2}$

(d) $3(5^{2x+4}) = 75$

(9) 8. For the function, $y = x^2 - x - 6$, find the following:

(a) the intercepts

(b) the vertex

(c) the maximum or minimum value

(d) sketch the function

(e) the Domain and Range.

(4) 9. Sara Lahr owns and operates Aunt Emma's Blueberry Pies. She has hired a consultant to analyze her business operations. The consultant tells her that her profits, $P(x)$, from the sales of x -units of pies, are given by $P(x) = 120x - x^2$. How many pies should she sell to maximize profit? What will this profit be?

(3) 10. Sketch the graph of $y = (x - 1)(x + 2)(x - 3)$. Show all intercepts.

(5) 11. Solve the following inequalities using the method of your choice. Express your answers using interval notation.

(a) $-2x + 3 \leq -5$

(b) $-x^2 + x + 12 > 0$

(6) 12. Evaluate the following. Express all answers in rational form.

(a) $\sin 30^\circ + \cos^2 60^\circ$

(b) $\cos 150^\circ - \tan 45^\circ$