

Final Exam

MATH 104

Saturday, July 37, 2039

7:83 – 9:83 PM Founders Auditorium

Instructions: Show *all* work. Failure to show work may result in loss of credit. Write your solutions in the space provided on the *answer sheets*. Do *not* hand in scratch paper. There are fifteen questions. You may use your graphing calculators (*not* those with CAS capabilities!) for all questions, but your answers must be exact, not just decimal approximations. Assume that the variables are restricted to values that prevent division by 0. Please remember to *simplify* your answers. Some partial credit *may* be given. **Good Luck!**

- 1) Solve the following systems of equations. (a) $2x - 5y = 3$; $3x + 2y = -5$; (b) $2x - 6y = 1$; $3x - 9y = 2$
- 2) Solve (a) $-7 + (-y + 2) < 7 + 2(1 - 5y)$; (b) $|2x + 3| = |5x - 1|$.
- 3) Graph the function $f(x) = -x^2 + x + 5$ and determine its domain and range.
- 4) A boat can go 16 miles downstream in an hour but only 10 miles upstream in an hour. Determine the rate of the current and the rate of the boat in still water.
- 5) Construct a quadratic equation in x with solutions of $4 - 5i$ and $4 + 5i$. Simplify.
- 6) Perform the indicated operations and simplify: $4z^{-3/7}(z^{6/5} - 2z^{2/7})$. Assume that $z > 0$ and express your answer in terms of positive exponents.
- 7) Perform the indicated operations and simplify your answers:
(a) $4\sqrt{75} + \sqrt{108}$; (b) $\frac{4}{4 - \sqrt{18}}$.
- 8) Factor completely: (a) $18y^2 - 29y + 3$; (b) $14x^4 + 3x^3 - 2x^2$.
- 9) Reduce $\frac{3-a}{81-a^4}$ to lowest terms. 10) Solve $x - \sqrt{9x+4} = 2$.
- 11) Let $f(x) = \frac{3x-2}{x^2+2x}$. Determine the vertical asymptotes of the graph of this function.
- 12) Solve $\frac{x+1}{x+2} - \frac{4}{x^2-4} = 1$. 13) Solve for c : $\frac{b-2}{c} = \frac{3}{a+b}$.
- 14) Perform the indicated operations and express the answer in standard $a + bi$ form.
(a) i^{290} ; (b) $(4 - 4i)^4$;
- 15) Forty meters of rope are used to enclose a rectangular area of 91 square meters. Find the dimensions of this rectangular area.

Points: 10+10, 10+10, 10; 10, 10, 10, 10+10; 10+10, 10, 10, 10; 10, 10, 10+10, 10.

You are welcome to keep this *Questions sheet* for your files.