

Name: _____

MS5 Exam 3 Review Sheet

Exam 3 will be on Wednesday, November 15, 2006. The exam will focus on the following topics: operations with complex numbers; powers of i ; simplifying fractions with complex denominators; graphing complex numbers; the sum and product of the roots of a quadratic equation; the nature of the roots of a quadratic equation; the concept of relations and functions and how they may be represented as sets of ordered pairs, using arrow diagrams, and graphically; domain and range; and using function notation. Though the emphasis will be on these topics, you are still expected to know all of the concepts and skills taught since the beginning of the semester. Graphing calculators, though not required, may be used on the exam, with the following exceptions: TI-89, TI-92, or any calculator with symbolic manipulation abilities.

1. State the domain of $f(x) = \frac{x^2 - 3x + 2}{x^2 - 9}$.
2. One root of a quadratic equation is $3 + \sqrt{2}i$. Determine the other root and write the equation that has these values as roots.
3. Express the multiplicative inverse of $5 - 7i$ in $a + bi$ form.
4. In what quadrant does the sum of $6 - 5i$ and $4 + 6i$ lie?
5. What is the positive value of m in the equation $4x^2 + mx + 9 = 0$ that makes the roots of the equation real, equal, and rational?
(1) 12 (3) 3
(2) 9 (4) 4
6. The roots of the quadratic equation $4x^2 = 2 + 7x$ are best described as
(1) real, equal, and rational. (3) real, unequal, and irrational.
(2) imaginary. (4) real, unequal, and rational.
7. If $f(x) = x - 10$ and $g(x) = 10 - 2x$ and $f(x) = g(x) + 10$, then x is
(1) 1 (3) -1
(2) 10 (4) -10
8. If $R = \{(-2, 3), (a, 4), (1, 9), (0, 7)\}$, which replacement for a makes this relation a function?
(1) 1 (3) 0
(2) -2 (4) 4
9. In the set of complex numbers, $(3 + 2i)(2 - 5i) = 4c + di$. Find the values of *both* c and d .
10. Every real number is also:
(1) complex. (3) pure imaginary.
(2) imaginary. (4) rational.
11. The roots of the equation $x^2 - 8x = 8(x - 8)$ are
(1) rational and equal. (3) irrational and equal.
(2) irrational and unequal. (4) rational and unequal.
12. For what values of p are the roots of the equation $2x^2 - x - p = 0$ imaginary?
13. Find all values of n such that the roots of the equation $2x^2 - x - 8p = 0$ are equal.

14. Express in $a+bi$ form: $(1-\sqrt{-9})(2-\sqrt{-1})$.

15. Express in simplest $a+bi$ form: $(i^3-1)(i^3+1)$.

16. What is the product of $5+\sqrt{-36}$ and $1-\sqrt{-49}$ expressed in simplest $a+bi$ form?

(1) $-37+41i$

(3) $47+41i$

(3) $5-71i$

(4) $47-29i$

17. Solve for x and express the roots in simplest $a+bi$ form: $4+\frac{5}{n^2}=\frac{6}{n}$.

18. Simplify and express in terms of i : $\frac{\sqrt{-36}}{-\sqrt{36}}$.

19. Given $f(x) = ax^2 + bx + c$, where a , b , and c are constants, make a rough sketch of the graph of $f(x)$ (correctly showing the number of x -intercepts) for each of the following cases:

i) the discriminant is positive.

ii) the discriminant is zero.

iii) the discriminant is negative.

20. If $f(x) = x^2$, what is the value of $f(i^3)$?

21. If $f(x) = \frac{x-1}{2-x}$, for what value(s) of x will $f(x) = 0$?

(1) 1

(3) both 1 and 2

(2) 2

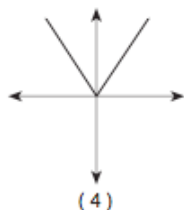
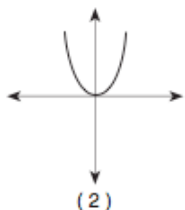
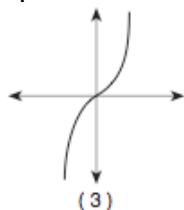
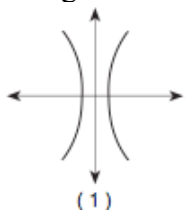
(4) neither 1 nor 2

22. If $h(x) = -2x^2 + x - 3$, find each of the following in simplest form:

a) $h(-x)$.

b) $h(x+2)$.

23. Which diagram does *not* represent a function?



24. The revenue, $R(x)$, from selling x units of a product is represented by the equation $R(x) = 35x$, while the total cost, $C(x)$, of making x units of the product is represented by the equation $C(x) = 20x + 500$. The total profit, $P(x)$, is represented by the equation $P(x) = R(x) - C(x)$. For the values of $R(x)$ and $C(x)$ given above, what is $P(x)$?

(1) $15x$

(3) $15x - 500$

(2) $15x + 500$

(4) $10x + 100$

25. In the equation $ax^2 + bx + c = 0$, a , b , and c are integers. If $\frac{1}{3} - \frac{2}{3}i$ is a root of this equation, find the values of a , b , and c .