

MATH 149

Spring 2009

Test 2

Name: _____

- No books, notes, or calculators are allowed.
- Please show all your work. You can use the back of each page for scratch paper.

1. (20%) For which values of b the function $f(x) = 3x^2 + bx + 12$ has exactly one real root? Sketch the graph of $f(x)$ for each of these values.

2. (15%) Solve: $\sqrt{x^2 - x - 12} < x$.

3. (15%) Derive or prove the quadratic formula.

4. (15%) Agnes has read 90 pages in 50 minutes. How many pages (of the same size) can she read in 3 hours? How many pages can she read in 4 days?

5. (15%) Explain why there are $\binom{n}{k} = \frac{n!}{k!(n-k)!}$ ways to choose k objects out of n .

6. (20%) Determine which of the following is possible. If possible, give an example. If not possible, explain why.

(a) Can a polynomial of degree 5 with real coefficients have 2 real roots and 3 complex roots?

(b) Can a polynomial of degree 5 with real coefficients have 3 real roots and 2 complex roots?

(c) Can a polynomial of degree 5 with real coefficients have 4 real roots and 2 complex roots?

