

Sample Exam II

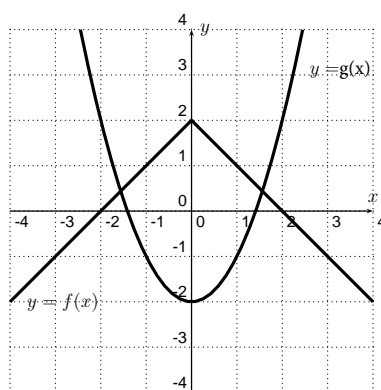
MAT 1375

NAME:

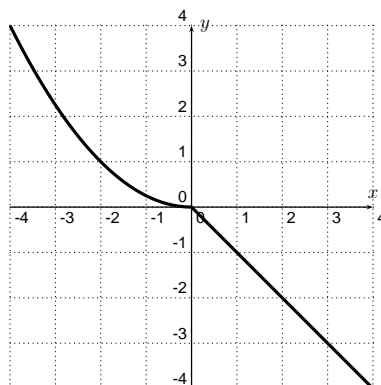
Part I. Functions.

1. If $f(x) = x^2 + 1$ and $g(x) = \frac{1}{x}$, write the rule and give the domain and range for:
a) $(f \circ g)(x)$ b) f/g c) $f - g$

2. Given the graph of f and g below, evaluate: a) $(f + g)(1)$ b) $(f \circ g)(2)$ c) $\left(\frac{f}{g}\right)(0)$



3. Given the graph of f below, graph check whether f is invertible and if it is, graph its inverse



4. Find the inverse of the function given below and check your answer by performing the relevant compositions.

$$f(x) = 6 + \sqrt{2x - 4}$$

5. Restrict the domain of $f(x) = \sqrt{x^2 + 1}$ so that it has an inverse.

Part II. Polynomials and Rational functions.

1. Divide $x^5 - x^3 + x + 6$ by $x - 2$.
2. Find the remainder when $x^3 + 2x - 1$ is divided by $x + 2$ without dividing (by any method).
3. Use the Factor Theorem to determine whether or not $h(x) = x - 2$ is a factor of $f(x) = x^3 - x^2 - 4x + 4$.
4. Find a polynomial of degree 3 with roots -3 , 0 , and 4 , and with $f(5) = 80$.
5. Find all real roots of the polynomial $6x^3 - 13x^2 + x + 2$ then express the polynomial as a product of its factors.
6. Write down a polynomial of degree 3 that has real coefficients and a root at $2 + i$.
7. Write down a polynomial that has complex coefficients that has roots at i and $2 - i$.
8. Sketch a complete graph of the function $f(x) = x^5 - 3x^3 + x$ and label the extrema and all intercepts (exactly if possible).

9. Find the domain, all horizontal asymptotes, vertical asymptotes, removable singularities (holes), and x - and y - intercepts. Use this information together with the graph of the calculator to sketch the graph of

$$(a) f(x) = \frac{x^2 + 3x + 2}{x_1}$$

$$(b) g(x) = \frac{x^3 - 4x}{x^2 - 8x + 15}$$

$$(c) h(x) = \frac{x^4 - 10x^2 + 9}{x^2 - 3x + 2}$$

