

Math 120
Exam #3
Summer '10

Name:

1. 10 pts. Explain why the relation $x = y^6$ is not a function. Also give the domain and range.
2. 10 pts. Let $f(x) = x^2 - 3x + 1$. Find $f(-4)$ and $f(c+2)$.
3. 10 pts. each Find the domain and range of each function.

 - (a) $f(x) = x^2 + 2$ for $-3 \leq x \leq 5$
 - (b) $g(x) = \sqrt{7 - 3x}$
4. 10 pts. each Let $\varphi(x) = \frac{8}{x-4}$, $\psi(x) = \frac{x+1}{x-2}$.

 - (a) Find $\varphi + \psi$ and φ/ψ .
 - (b) Find $\text{Dom}(\varphi)$ and $\text{Dom}(\psi)$.
 - (c) Find $\text{Dom}(\varphi/\psi)$.
5. 10 pts. each Let $\alpha(x) = \sqrt{9 - x^2}$ and $\beta(x) = \sqrt{x+8}$.

 - (a) Find $\alpha \circ \beta$ and $\alpha \circ \alpha$.
 - (b) Find $\text{Dom}(\alpha)$ and $\text{Dom}(\beta)$.
 - (c) Find $\text{Dom}(\alpha \circ \beta)$
6. 10 pts. Let $W = \left[\frac{12}{(x-7)^5} \right]^8$. Find functions f , g and h such that $f \circ g \circ h = W$.
7. 10 pts. Show the function $z(x) = x^2 + 4x - 21$ is *not* one-to-one.
8. 15 pts. each Each function f below is one-to-one. Find the inverse f^{-1} of each function, and state the domain and range of both f and f^{-1} .

 - (a) $f(x) = x^3 - 7$
 - (b) $f(x) = \frac{x-4}{x+5}$
9. 10 pts. Use synthetic division to perform the division: $\frac{x^5 + 3x^4 + 2x^3 + 2x^2 + 3x + 1}{x+2}$
10. Consider the polynomial function f defined by $f(x) = 8x^4 - 14x^3 - 29x^2 - 4x + 3$.

 - (a) 5 pts. Applying the Rational Zeros Theorem, list the possible rational zeros of the function.
 - (b) 10 pts. Find all rational zeros of the function f .
 - (c) 5 pts. Fully factor the polynomial $f(x)$.
11. 10 pts. Find a polynomial function f of degree 3 with -2 , 1 , and 4 as zeros, and $f(2) = 16$
12. 10 pts. Find a polynomial function of least degree with real coefficients and having 3 and $2 + i$ as zeros.