

Name _____ Date _____ Period _____

Worksheet P.6—Fun with Functions

Show all work. No Calculator

I. Multiple Choice

_____ 1. If $p(x) = (x+2)(x+k)$ and if the remainder is 12 when $p(x)$ is divided by $x-1$, then $k =$
(A) 2 (B) 3 (C) 6 (D) 11 (E) 13

_____ 2. If $f(x) = \frac{4}{x-1}$ and $g(x) = 2x$, then the solution set of $f(g(x)) = g(f(x))$ is
(A) $\left\{\frac{1}{3}\right\}$ (B) $\{2\}$ (C) $\{3\}$ (D) $\{-1, 2\}$ (E) $\left\{\frac{1}{3}, 2\right\}$

_____ 3. If the function f is defined by $f(x) = x^5 - 1$, then f^{-1} , the inverse function of f , is defined by
 $f^{-1}(x) =$
(A) $\frac{1}{\sqrt[5]{x+1}}$ (B) $\frac{1}{\sqrt[5]{x-1}}$ (C) $\sqrt[5]{x-1}$ (D) $\sqrt[5]{x} - 1$ (E) $\sqrt[5]{x+1}$

- _____ 4. If $a, b, c, d,$ and e are real numbers and $a \neq 0$, then the polynomial equation $ax^7 + bx^5 + cx^3 + dx + e = 0$ has
(A) only one real root (B) at least one real root (C) an odd number of nonreal roots
(D) no real roots (E) no positive real roots
- _____ 5. If $f(x) = 2x^3 + Ax^2 + Bx - 5$ and if $f(2) = 3$ and $f(-2) = -37$, what is the value of $A + B$?
(A) -6 (B) -3 (C) -1 (D) 2 (E) cannot be determined from given info
- _____ 6. Dividing the polynomial $f(x) = x^3 + 3x^2 - 12$ by the polynomial $p(x) = x + 1$ gives a remainder of what?
(A) 0 (B) -10 (C) 10 (D) -8 (E) none of these
- _____ 7. Find the inverse of the function $f(x) = \frac{3x+2}{x}$, where $x \neq 0$. $f^{-1}(x) =$
(A) $\frac{1}{3x}$ (B) $\frac{x}{2x-3}$ (C) $\frac{x}{2x+3}$ (D) $\frac{2}{x-3}$ (E) none of these

II. Free Response

8. Divide $f(x) = x^3 + 2x^2 - 8x - 5$ by $x^2 + 3$. State the quotient and remainder

9. For $f(x) = \frac{6x+4}{4x+5}$

(a) Find the inverse function of f .

(b) Do long division on both f and f^{-1} , and rewrite each as a transformation of a parent function.

(c) Graph both f and f^{-1} on the same set of coordinate axes (without using a calculator).

(d) Describe the relationship between the graphs of f and f^{-1} .

(e) State the domain and range of both f and f^{-1} .

10. For $f(x) = 2x^2 - kx^2 + 3x - k$, find the value of k so that when $f(x)$ is divided by $x + 1$ the remainder is $\frac{2}{3}$.