P12 - Inverse Functions

If a function has an inverse that is also a function, it is called a *one to one* function

All *one to one* functions pass both the vertical and horizontal line tests for the graph of the function f

The inverse of a *one to one* function is denoted as: $f^{-1}(x)$

To find the inverse of a function:

Step 1	Replace $f(x)$ with y
Step 2	Interchange x and y
Step 3	Solve for y
Step 4	Replace y with $f^{-1}(x)$

Example 1 Find the inverse function

a. $f(x) = \frac{x-1}{x+2}$

$y = \frac{x-1}{x+2}$

$x = \frac{y-1}{y+2}$

$x(y+2) = y-1$

$xy + 2x = y-1$

$xy - y = -2x - 1$

$y(x-1) = -2x-1$

$y = \frac{-2x-1}{x-1}$

$f^{-1}(x) = \frac{-2x-1}{x-1}$

b. $f(x) = \sqrt{x-4}$

$y = \sqrt{x-4}$

$x = \sqrt{y-4}$

$x^2 = y-4$

$y = x^2 + 4$

$f^{-1}(x) = x^2 + 4$

c. $f(x) = \frac{x+7}{x}$

$y = \frac{x+7}{x}$

$x = \frac{y+7}{y}$

$xy = y+7$

$xy - y = 7$

$y(x-1) = 7$

$y = \frac{7}{x-1}$

$f^{-1}(x) = \frac{7}{x-1}$

$xy - 7 =$

HW; 16, 19-22, 24

Find $f^{-1}(x)$

13. $g(x) = -3x^4 + 6x^2 - x$

14. $f(x) = 4x^5 - 8x^4$

15. $h(x) = x^7 + 2x^3 - 10x^2$

16. $f(x) = \sqrt{x+8}$

17. $f(x) = \sqrt{6 - x^2}$

18. $f(x) = |x - 6|$

19. $f(x) = \frac{4-x}{x}$

20. $g(x) = \frac{x-6}{x}$

21. $f(x) = \frac{6}{\sqrt{8-x}}$

22. $g(x) = \frac{7}{\sqrt{x+3}}$

23. $f(x) = \frac{6x+3}{x-8}$

24. $h(x) = \frac{x+4}{3x-5}$

25. $g(x) = |x+1| + |x-4|$

(24) $h(x) = \frac{x+4}{3x-5}$ $\quad x = \frac{y+4}{3y-5}$

$x(3y-5) = y+4$

$3xy - 5x = y + 4$

$3xy - y = 5x + 4$

$y(3x-1) = 5x+4$

$y = \frac{5x+4}{3x-1}$

$f^{-1}(x) = \frac{5x+4}{3x-1}$