8. If $f(x) = (x-2)\sqrt{x+1}$. Let g be the inverse of f. Find $g'(18)$.

$18 = (x-2)\sqrt{x+1}$

$g'(18) = \frac{1}{f'(8)} = \boxed{\frac{1}{4}}$

$x=8$

$18 \overset{\checkmark}{=} (8-2)\sqrt{8+1}$

$f' = \sqrt{x+1} + (x-2) \cdot \frac{1}{2\sqrt{x+1}} \Big|_{x=8} = 3 + 6 \cdot \frac{1}{2 \cdot 3} = 4$

USE OF CHARTS

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
2	2	-1	5	-4
3	4	2	1	0
4	-2	6	-3	2

10. Find the derivative of f^{-1} at $x = 4$.

11. Find the derivative of g^{-1} at $x = 6$.

$$g^{-1\prime}(6) = \frac{1}{g'(4)} = \frac{1}{2}$$

5. If $f(x) = (x-1)(x-2)(x-3) = \cancel{x^3-6x^2+11x+6}$ and $g = f^{-1}$, find $g'(6)$

3 2 1

$x=4$

$= x^3 - 6x^2 + 11x - 6$

$f' = 3x^2 - 12x + 11 \Big|_{x=4} = 11$

$$g'(6) = \frac{1}{f'(4)} = \frac{1}{11}$$

$2 = x^3 + x$

1. Let $f(x) = x^3 + x$. If h is the inverse of f, then $h'(2) = \dfrac{1}{f'(1)} = \dfrac{1}{4}$

A) 1/13 B) 1/4 C) 1 D) 4 E) 13

$f' = 3x^2 + 1 \Big|_{x=1} = 4$

6. If $f(x) = 5x^2 + 1$ for $x \geq 0$, and $g = f^{-1}$, find $g'(11) = \dfrac{1}{f'(\sqrt{2})} = \dfrac{1}{10\sqrt{2}}$

$11 = 5x^2 + 1$

$10 = 5x^2$

$2 = x^2$

$\pm\sqrt{2} = x \longrightarrow x = \sqrt{2}$

$f' = 10x \Big|_{x=\sqrt{2}} = 10\sqrt{2}$

9. Find an equation of the line tangent to the inverse of $f(x) = \frac{x-2+2}{x-2}$ at the point (2,4).

$f' = -2(x-2)^{-2}\Big|_4 = -\frac{1}{2} \leftarrow = 1 + \frac{2}{x-2}$

$f(4) = 2$ $g(2) = 4$, $g(f(x)) = x$

$\boxed{y-4 = -2(x-2)}$

$g'(2) = \frac{1}{f'(4)} = -2$

4. The length of a rectangle is increasing at a rate of 8 cm/s and its width is increasing at a rate of 3 cm/s. When the length is 20 cm and the width is 10 cm, how fast is the area of the rectangle increasing?

$$A = lw$$

$$\frac{dA}{dt} = \frac{dl}{dt}w + l\frac{dw}{dt} = 8(10) + 20(3)$$

$$= 80 + 60 = \underline{\underline{140}}$$

increasing $140 \text{ cm}^2/\text{s}$