

4.4 Restrictions on Composite Functions

Note Title

18/10/2012

Find the domain & range of $y = (f \circ g)(x)$ if $f(x) = \sqrt{x}$ and $g(x) = -x^2 + 2x$.

$$\begin{aligned} y &= f(g(x)) \\ &= f(-x^2 + 2x) \\ &= \sqrt{-x^2 + 2x} \end{aligned}$$

$$D: -x^2 + 2x \geq 0$$

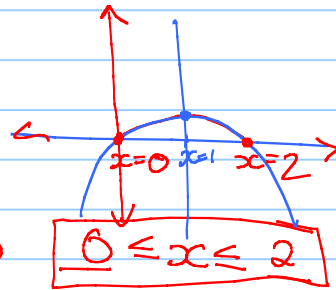
$$\text{Zeros: } -x^2 + 2x = 0$$

$$-x(x-2) = 0$$

$$x = 0, 2$$

\therefore Domain is $0 \leq x \leq 2$

$$\begin{aligned} \text{Range: } 0 \leq y \leq \textcircled{1} & \quad \sqrt{(\text{max of } -x^2 + 2x)} \\ & \quad \sqrt{-(1)^2 + 2(1)} \\ & \quad = \sqrt{1} \\ & \quad = 1 \end{aligned}$$



Write each function as a composite of two functions.

a) $y = (2x-1)^3$

b) $y = \frac{1}{x+1}$

$$y = f(g(x))$$

$$y = g(f(x))$$

$$f(x) = x^3$$

$$f(x) = x+1$$

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

$$g(x) = \frac{1}{x}$$