

1. Given:  $f(x) = x^3$

$g(x) = x + 1$

$j(x) = \sqrt{x}$

$p(x) = 3x^2$

1.  $(p \circ g)(-1) = \frac{3}{3}$

2.  $(g \circ a)(a+1) = a^4 + a^3$

3.  $(f \circ p)(-2) = 12$

4.  $j(p(g(3))) = 4\sqrt{3}$

5.  $p(j(x)) = 3x$

6.  $p(j(g(x))) = 3(\sqrt{x+1})^2$

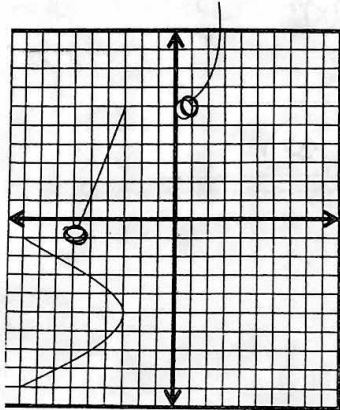
7.  $f(x+h) = (x+h)^3 = x^3 + 3x^2h + 3xh^2 + h^3$

8.  $p(x+h) - p(x) = 6hx + 3h^2$

9. Given the composition for the  $k(x) = \sqrt{x^2 + 1}$ . If  $k(x) = f(g(h(x)))$ , then  $g(x) = x + 1$

10. Find the difference quotient of:  $f(x) = 2x^3 - x - 7$

$$\frac{f(x+h) - f(x)}{h} = \frac{2(x+h)^3 - (x+h) - 7 - [2x^3 - x - 7]}{h} = \frac{2x^3 + 6x^2h + 6xh^2 + 2h^3 - x - h - 7 - 2x^3 + x + 7}{h} = \frac{6x^2h + 6xh^2 + 2h^3 - h}{h} = 6x^2 + 6xh + 2h^2 - 1$$



14. Give the piecewise function  $f(x)$

$$f(x) = \begin{cases} (x+5)^2 + 3 & -9 \leq x \leq -1 \\ -\frac{1}{2}x + 5.5 & -1 < x \leq 6 \\ -\sqrt{x} - 1 & x > 6 \end{cases}$$

Evaluate inverse trig functions.

15.  $\cos^{-1} -1/2 = 2\pi/3$

16.  $\sin^{-1} \frac{\sqrt{3}}{2} = \pi/3$

17.  $\tan^{-1} \sqrt{3} = \pi/3$

18.  $\cos^{-1}(\sin 11\pi/6) = \pi/3$

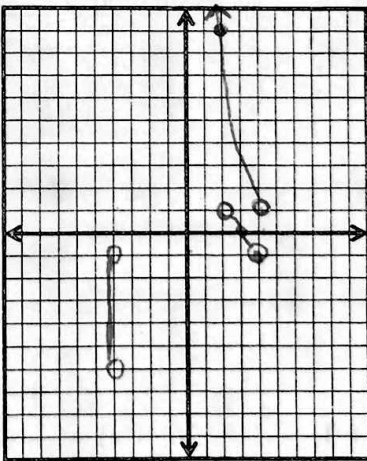
19.  $\cos^{-1}(\tan 5\pi/4) = \pi$

20.  $\tan(\cos^{-1} 1) = 0$

21.  $\sin(\tan^{-1} \frac{\sqrt{3}}{3}) = 1/2$

Graph the following piecewise function.

$$f(x) = \begin{cases} 4 & -6 < x < -1 \\ x^3 - 3 & -1 < x < 1 \\ \sqrt{x} - 5 & 1 < x \leq 9 \end{cases}$$



11. Domain:  $(-6, -1) \cup (-1, 1) \cup (1, 9]$

12. Range:  $(-4, \infty)$

13. What is  $f(1/2)$ ?  $\frac{1}{8} - 3 = -\frac{23}{8}$

use  $x^3 - 3$

Are the following pair of functions inverses? Show your work to support your answer.

22.  $f(x) = \frac{x+3}{3}$   $g(x) = (1/3)x - 3$

$$f(g(x)) = \frac{\frac{1}{3}x - 3 + 3}{3} = \frac{\frac{1}{3}x}{3} = \frac{1}{9}x$$

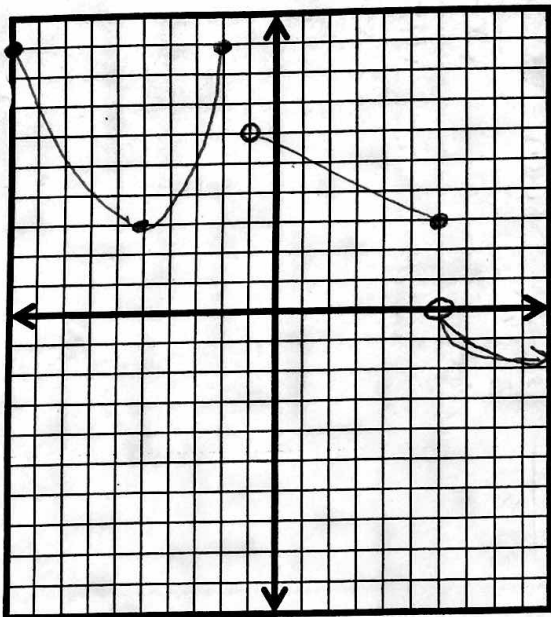
None.

23.  $f(x) = \sqrt{x+2} - 3$   $g(x) = x^2 - 6x + 7$

$$f(g(x)) = \sqrt{x^2 - 6x + 7 + 2} - 3 = \sqrt{x^2 - 6x + 9} - 3 = \sqrt{(x-3)^2} - 3 = |x-3| - 3 = x-6$$

None.

Given the following function,  $f(x)$ , answer the following questions.



24. Give the value of  $f(1/2)$  5.5
25. For what value(s) of  $x$  is  $f(x) = -1$ ? 7  $[-10, -5]$
26. Give the interval(s) where the function is decreasing.  $\cup (-1, \infty)$
27. Give the domain of  $f(x)$   $[-10, -2] \cup (-1, \infty)$
28. Where does the maximum value occur?  $x = -10$  and  $-2$
29. What is the local minimum value of  $f(x)$ ? 3
30. Is  $f(3)$  positive or negative? POS.
31. For what values of  $x$  is  $f(x) < 0$   $(6, \infty)$

Consider the graphs of the following. Give the domain and range.

32.  $y = \sqrt[3]{x+2}$

Domain  $(-\infty, \infty)$   
Range  $(-\infty, \infty)$

33.  $y = e^{(x+2)}$

Domain  $(-\infty, \infty)$   
Range  $(0, \infty)$

34.  $f(x) = \frac{1}{(x+4)} - 2$

Domain  $(-\infty, -4) \cup (-4, \infty)$   
Range  $(-\infty, -2) \cup (-2, \infty)$

35.  $f(x) = 3\sin(x + \pi/4) + 3$

Domain  $(-\infty, \infty)$   
Range  $[0, 6]$

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

Domain  $(-\infty, 0) \cup (0, \infty)$   
Range  $(-\infty, -1) \cup (-1, \infty)$

37.  $f(x) = (x)^3 - 2$

Domain  $(-\infty, \infty)$   
Range  $(-\infty, \infty)$