

Precalculus Test Review

1. $(f \circ g)(x)$
 $(x+2)^2 - 4$
 $x^2 + 4x + 4 - 4$
 $x^2 + 4x$

2. $(g \circ f)(x)$
 $(x^2 - 4) + 2$
 $x^2 - 2$

3. $(f \circ g)(3)$
 21

4. $y = x^2 + 10x + 29$
 $y - 29 + 25 = x^2 + 10x + 25$
 $y - 4 = (x + 5)^2$
 $y = (x + 5)^2 + 4$
 see graph

5. $y = (x - 4)^3 + 1$
 see graph

6. $y = |x + 3| - 2$
 see graph

7. $y = \pm \sqrt{x - 2} + 3$
 see graph

8. $y = \frac{1}{x+4} - 3$
 see graph

9. $f(x) = \sqrt{x - 5}$



D: $[5, \infty)$
 R: $[0, \infty)$

10. $f(x) = |x + 9| - 3$
 D: $(-\infty, \infty)$
 R: $[-3, \infty)$

11. $f(x) = x^2 - 6x + 2$
 $f(x) - 2 + 9 = x^2 - 6x + 9$
 $f(x) + 7 = (x - 3)^2$
 $f(x) = (x - 3)^2 - 7$
 D: $(-\infty, \infty)$
 R: $[-7, \infty)$

12. $f(x) = \sqrt{2 - \sqrt{x}}$
 D: $[0, \infty)$
 R: $[0, \sqrt{2}]$

13. $y = 4 \sin(x + 2)$
 D: $(-\infty, \infty)$
 R: $[-4, 4]$

14. $y = \frac{x^2 + x - 6}{x^2 + 2x - 8} = \frac{(x+3)(x-2)}{(x+4)(x-2)} = \frac{x+3}{x+4}$
 D: $x \neq -4, 2$
 hole(s): $(2, \frac{5}{6})$ HA: $y = 1$
 VA: $x = -4$ SA: none

15. $y = \frac{x^2 + 3x - 4}{x + 7} = \frac{(x+4)(x-1)}{(x+7)}$

D: $x \neq -7$
 hole(s): none HA: none
 VA: $x = -7$ SA: $y = x - 4$

$\begin{array}{r} \overline{) 1 \ 3 \ -4} \\ \underline{-1 \ -4} \\ 1 \ -4 \end{array}$

$$16. y = \frac{x-4}{x^2+9x-22} = \frac{x-4}{(x+11)(x-2)}$$

$$D: x \neq -11, 2$$

$$\text{hole(s): none} \quad \text{HA: } y=0$$

$$\text{VA: } x=-11, x=2 \quad \text{SA: none}$$

$$17. 2\log_4(x-3) + \log_4(2x)$$

$$\log_4(x-3)^2 + \log_4(2x)$$

$$\log_4(2x)(x-3)^2$$

$$\log_4(2x)(x^2-6x+9)$$

$$\log_4 2x^3 - 12x^2 + 18x$$

$$18. 7^{x+4} = 96$$

$$\log_7 96 = x+4$$

$$x = \log_7 96 - 4$$

$$x = -1.654$$

$$19. \log_3 17 = x$$

$$x = 2.579$$

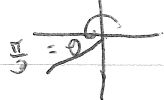
$$20. e^{3x} = 28$$

$$\ln 28 = 3x$$

$$x = \frac{\ln 28}{3}$$

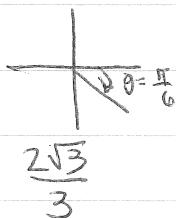
$$x = 1.111$$

$$21. \sin 240^\circ$$

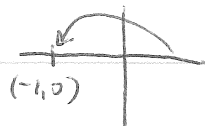


$$-\frac{\sqrt{3}}{2}$$

$$22. \sec^{-1} \frac{\pi}{6}$$



$$23. \tan 180^\circ$$



$$\frac{0}{1} = 0$$

$$24. \frac{\cos^2 \theta}{1 + \sin \theta} = 1 - \sin \theta$$

$$\frac{1 - \sin^2 \theta}{1 + \sin \theta} = 1 - \sin \theta$$

$$1 + \sin \theta$$

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{1 + \sin \theta} = 1 - \sin \theta$$

$$1 - \sin \theta = 1 - \sin \theta$$

$$25. a) f(5) = 9$$

$$b) f(1) = -2$$

$$c) (f \circ f)(3) = 11$$

see graph

$$26. a) f(-7) = 2$$

$$b) f(2) = 3$$

$$c) f(6) = 3$$

$$d) (f \circ f)(2) = 3/2$$

$$e) (f \circ f)(-6) = 1 + \sqrt{3}$$

see graph

$$f(x) = \frac{1}{2}x^3 - 7x^2 + 9x + 7 \quad g(x) = \frac{2}{3}x - 8$$

$$27. f(x) = 0$$

$$x = -5.41, 2.075, 12.466$$

$$28. f(x) = g(x)$$

$$x = -9.65, 2.494, 12.471$$

$$29. g(x) = 0$$

$$x = 12$$

30. $f(x) > -5$

$$\frac{1}{2}x^3 - 7x^2 + 9x + 7 > -5$$

$$\frac{1}{2}x^3 - 7x^2 + 9x + 12 > 0$$

$$(-.803, 2.412) \cup (12.391, \infty)$$

31. $g(x) \geq f(x)$

$$(-\infty, -.965] \cup [2.494, 12.471]$$

32. $f(x) > g(x)$

$$(-.965, 2.494) \cup (12.471, \infty)$$

33. increasing:

$$(-\infty, .695) \cup (8.639, \infty)$$

34. decreasing:

$$(.695, 8.639)$$

35. relative max: 10.042

36. relative min: -115.301

$$f(x) = 3\cos(2x + \pi) \left[-\frac{\pi}{6}, \frac{7\pi}{4} \right] \quad g(x) = \frac{9}{8}x - 4$$

37. $f(x) = g(x)$

$$x = 2.550, 4.013, 5.172$$

38. $f(x) \leq g(x)$

$$[2.550, 4.013] \cup [5.172, \frac{7\pi}{4}]$$

39. $f(x) = 0$

$$x = .785, 2.356, 3.927, \frac{7\pi}{4}$$

40. $g(x) \leq f(x)$

$$\left[-\frac{\pi}{6}, 2.550 \right] \cup [4.013, 5.172]$$

41. $f(x) > 3$

no solution

42. $g(x) = 0$

$$x = 3.927$$

$$43. f(x) = \sqrt[3]{1+x^3}$$

$$y = \sqrt[3]{1+x^3}$$

$$(x)^3 = (\sqrt[3]{1+y^3})^3$$

$$x^3 = 1+y^3$$

$$\sqrt[3]{x^3-1} = \sqrt[3]{y^3}$$

$$\sqrt[3]{x^3-1} = y$$

$$f^{-1}(x) = \sqrt[3]{x^3-1}$$

$$44. |2x+1| > 11$$

$$2x+1 > 11 \quad \text{or} \quad 2x+1 < -11$$

$$2x > 10$$

$$2x < -12$$

$$x > 5$$

$$x < -6$$



$$(-\infty, -6) \cup (5, \infty)$$

$$45. x^2 < 3x + 10$$

$$x^2 - 3x - 10 < 0$$

$$(x-5)(x+2) < 0$$



$$(-2, 5)$$

$$46. f(x) = 3x^2 + 4 \quad g(x) = \frac{3x+2}{2x-1}$$

$$a) f(2) = 3(2)^2 + 4$$

$$f(2) = 16$$

$$b) g(x+3) = \frac{3(x+3)+2}{2(x+3)-1}$$

$$g(x+3) = \frac{3x+9+2}{2x+6-1}$$

$$g(x+3) = \frac{3x+11}{2x+5}$$

$$c) g(f(a)) = \frac{3(3a^2+4)+2}{2(3a^2+4)-1}$$

$$g(f(a)) = \frac{9a^2+12+2}{6a^2+8-1}$$

$$g(f(a)) = \frac{9a^2+14}{6a^2+7}$$

$$d) \frac{f(x+2) - f(x)}{h}$$

$$\frac{3(x+2)^2 + 4 - [3x^2 + 4]}{h}$$

$$\frac{3(x^2 + 4x + 4) + 4 - 3x^2 - 4}{h}$$

$$\frac{3x^2 + 12x + 12 + 4 - 3x^2 - 4}{h}$$

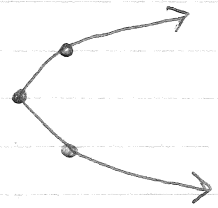
$$\frac{12x + 12}{h}$$

$$4. y = (x+5)^2 + 4$$



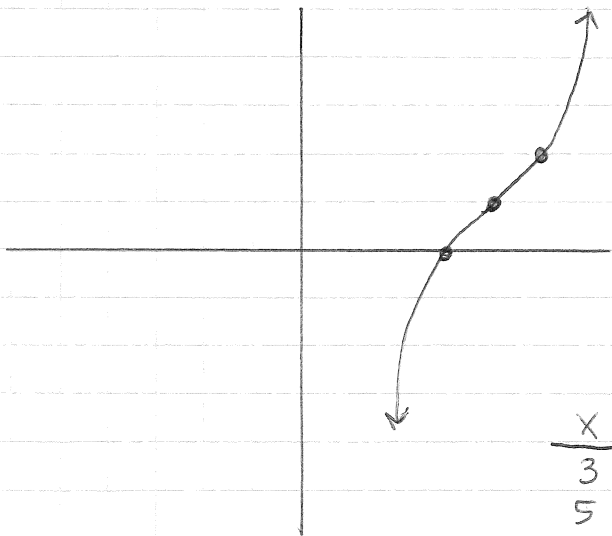
x	y
-6	5
-4	5

$$7. y = \pm \sqrt{x-2} + 3$$



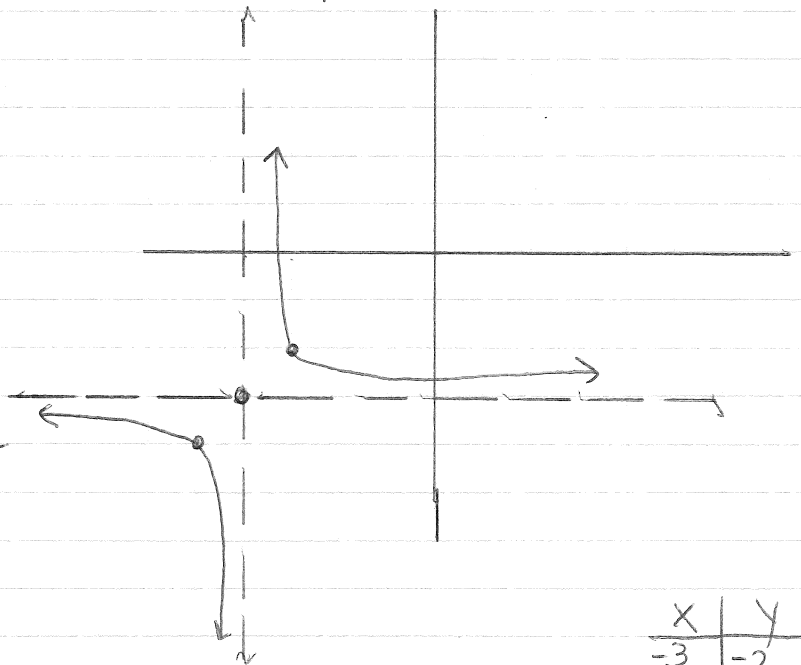
x	y
3	4
3	2

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



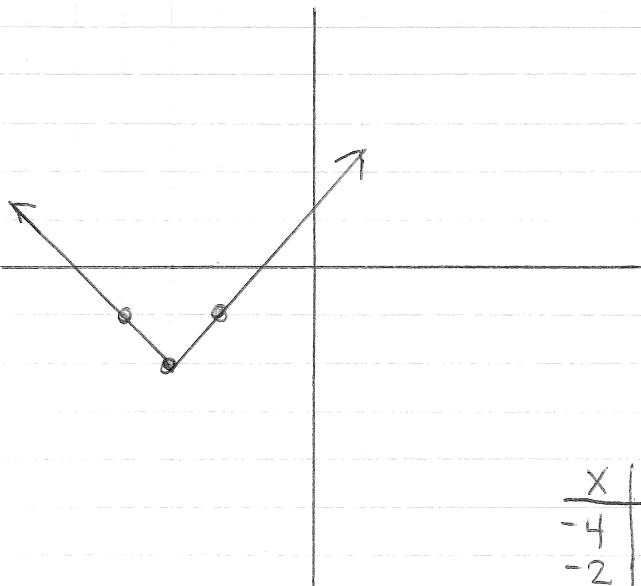
x	y
3	0
5	8

$$8. y = \frac{1}{x+4} - 3$$



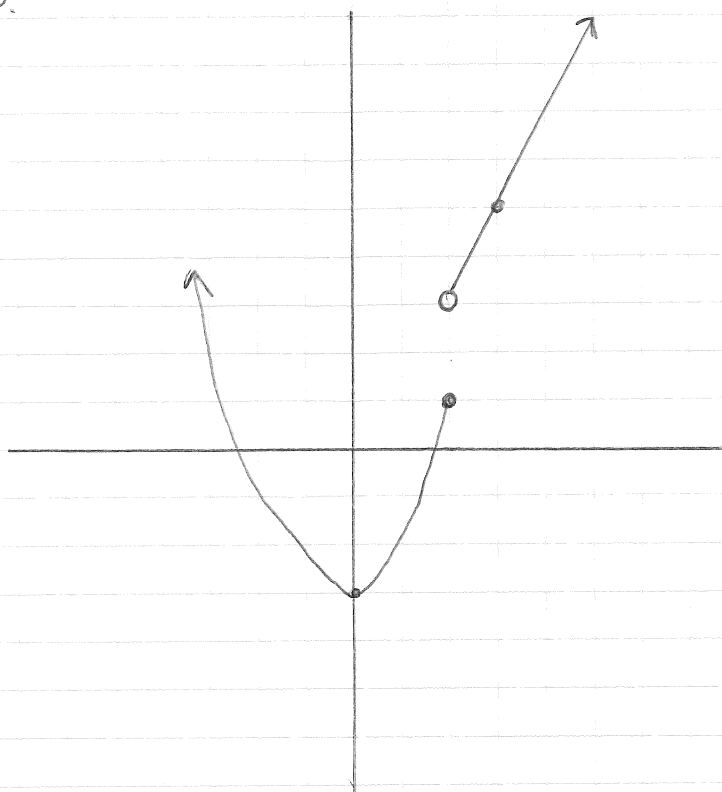
x	y
-3	0
-5	-4

$$6. y = |x+3| - 2$$



x	y
-4	-1
-2	-1

25.



26.

