

Pre-Cal Summer Assignment Key

1. $5 - 3(x - 2) = -2$

$$5 - 3x + 6 = -2$$

$$-3x = -13$$

$$x = \frac{13}{3}$$

2. $4x + 5(x - 2) = -2(3x + 1) - 7$

$$4x + 5x - 10 = -6x - 2 - 7$$

$$15x = 1$$

$$x = \frac{1}{15}$$

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

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

$$0 = x^2 - x - 6$$

$$(x - 3)(x + 2) = 0$$

$$x = 3, -2$$

4. $(5 - 3x)(x - 2) = 0$

$$5 - 3x = 0 \quad x - 2 = 0$$

$$x = \frac{5}{3}, 2$$

5. $x^2 - 9 = 0$ or $x^2 - 9 = 0$

$$\sqrt{x^2} = \sqrt{9}$$

$$\text{or } (x + 3)(x - 3) = 0$$

$$x = \pm 3$$

$$x = -3, 3$$

6. $x^2 + 5x = 0$

$$x(x + 5) = 0$$

$$x = 0, -5$$

7. $2x^2 = 4x$

$$2x^2 - 4x = 0$$

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

$$x = 0, 2$$

8. $x^2 - 9x - 10 = 0$

$$(x - 10)(x + 1) = 0$$

$$x = 10, -1$$

9. $x^2 + 7x = -12$

$$x^2 + 7x + 12 = 0$$

$$(x + 3)(x + 4) = 0$$

$$x = -3, -4$$

10. $2x^2 - x - 3 = 0$

$$(2x - 3)(x + 1) = 0$$

$$2x - 3 = 0 \quad x + 1 = 0$$

$$x = \frac{3}{2} \quad x = -1$$

11. $x^2 - 4x - 3 = 0$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{4 \pm \sqrt{16 - 4(1)(-3)}}{2}$$

$$\frac{4 \pm \sqrt{28}}{2} = \frac{4 \pm 2\sqrt{7}}{2}$$

$$= \boxed{2 \pm \sqrt{7}}$$

12. $x^2 + 6x = -12$

$$x^2 + 6x + 12 = 0$$

$$\frac{-6 \pm \sqrt{36 - 4(1)(12)}}{2}$$

$$\frac{-6 \pm \sqrt{-12}}{2}$$

$$\frac{-6 \pm 2i\sqrt{3}}{2}$$

$$= \boxed{-3 \pm i\sqrt{3}}$$

13. i) parallel lines will have equal slopes.
 ii) perpendicular lines will have opposite-reciprocal slopes.
 iii) Horizontal lines will have a zero slope.
 iv) Vertical lines have undefined slope.

14. i) slope-intercept form $\rightarrow y = mx + b$
 ii) standard form $\rightarrow Ax + By = C$
 iii) point-slope form $\rightarrow y - y_1 = m(x - x_1)$

15. $(0, -4)$ is the y-intercept

$$y = \frac{2}{3}x - 4$$

$$3y = 2x - 12$$

$$2x - 3y = 12$$

16. $y = mx + b$
 $1 = \frac{5}{2}(-2) + b$

$$6 = b$$

$$2y = 5x + 12$$

$$y = \frac{5}{2}x + 6$$

$$5x - 2y = -12$$

17. $m = \frac{1 - (-4)}{5 - 3} = \frac{5}{2}$

$$1 = \frac{5}{2}(5) + b$$

$$2 = 25 + 2b$$

$$b = \frac{-23}{2}$$

$$2y = 5x - 23$$

$$y = \frac{5}{2}x - \frac{23}{2}$$

$$5x - 2y = 23$$

18. $m = \frac{\frac{5}{4} - \frac{1}{2}}{\frac{1}{2} - 2} = \frac{\frac{3}{4}}{-\frac{3}{2}} = \frac{3}{4} \cdot \frac{-2}{3} = -\frac{1}{2}$

$$2y = -x + 3$$

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

$$\frac{3}{2} = b$$

$$y = -\frac{x}{2} + \frac{3}{2}$$

$$x + 2y = 3$$

19. $y = 7$

20. $x = 4$

21. $m = \frac{1}{2}$

$-3 = \frac{1}{2}(4) + b$

$y = \frac{1}{2}x - 5$

$2y = x - 10$

$x - 2y = 10$

$-5 = b$

22. $5 = 2x - 3y$

$-3 = 4(-\frac{3}{2}) + b$

$2y = 3x + 6$

$3y = 2x - 5$

$y = \frac{2}{3}x - \frac{5}{3}$

$-3 = b$

$3x + 2y = 6$

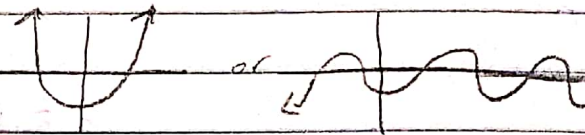
$m_1 = -\frac{3}{2}$

$y = -\frac{3}{2}x + 3$

23. set y equal to 0.

24. set all x 's equal to 0.

25. yes, infinitely many.



26. No, will not be a function.

Will fail the vertical line Test.

27. x-int: $0 = -3x + 9$

y-int: $y = -3(0) + 9$

$-9 = -3x$

$3 = x$

$y = 9$

$(3, 0)$

$(0, 9)$

28. $0 = (x+1)(x-3)$

$x = -1, 3$

y-int: $y = (0+1)(0-3)$

$y = 1(-3) = -3$

x-ints: $(-1, 0); (3, 0)$

$(0, -3)$

29. x-int: $0 = -x(x+3)$
 $x = 0, -3$
 $(0, 0), (-3, 0)$

y-int: $y = -0^2 - 3(0)$
 $y = 0$
 $(0, 0)$

30. x-int: $0 = |x-2| - 1$
 $1 = |x-2|$
 $x-2 = 1$ or $x-2 = -1$
 $x = 3$ or $x = 1$
 $(3, 0); (1, 0)$

y-int: $y = |0-2| - 1$
 $y = 2 - 1$
 $y = 1$
 $(0, 1)$

31. x-int: $0 = |x+1| + 3$
 $-3 = |x+1|$
 no sol. ∴
 no x-ints

y-int: $y = |0+1| + 3$
 $y = 4$
 $(0, 4)$

32. x-int: $0 = \frac{x-3}{x+1}$
 $0 = x-3$
 $x = 3$
 $(3, 0)$

y-int: $y = \frac{0-3}{0+1}$
 $y = -\frac{3}{1}$
 $(0, -3)$

33. $f(-3) = (-3+1)(-3+3)$
 $= -2(0) = 0$

34. $f(-3) = -(-3)^2 + 5(-3)$
 $= -9 - 15 = -24$

35. $f(-3) = \sqrt{-3+19} = \sqrt{16}$
 $= 4$

36. $f(-3) = 3(-3)^3 + 2(-3)^2 - 5(-3)$
 $= 3(-27) + 2(9) + 15 - 1$
 $= -21 + 18 + 15 - 1 = -49$

37. $f(-3) = -1$

38. $f(-3) = -1$

39. 1. when $x=2, y=0$
 3. x-intercept

2. $(2, 0)$
 4. crosses x-axis when graphed

$$40. 2(3x-4) + 3(2x^2-4x+1)$$

$$6x - 8 + 6x^2 - 12x + 3$$

$$\boxed{6x^2 - 6x - 5}$$

$$41. 2x^2 - 4x + 1 - 2(3x-4)$$

$$2x^2 - 4x + 1 - 6x + 8$$

$$\boxed{2x^2 - 10x + 9}$$

$$42. (3x-4)(2x^2-4x+1) = 6x^3 - 12x^2 + 3x - 8x^2 + 16x - 4$$

$$\boxed{6x^3 - 20x^2 + 19x - 4}$$

$$43. 3(2x^2-4x+1) - 4$$

$$6x^2 - 12x + 3 - 4$$

$$\boxed{6x^2 - 12x - 1}$$

$$44. 4(2) + 3(7) - 11$$

$$8 + 21 - 11$$

$$\boxed{18}$$

$$45. g(1) = -1 \Rightarrow f(-1) = -7 \Rightarrow g(-7) = 2(49) + 23 + 1 = \boxed{127}$$

47. you must be able to graph basic

50. functions: linear, quadratic, radical, rational

51. The solution is the point of intersection.

52. The graphs will never intersect. May be parallel.

$$53. x - (3x - 2) = 8$$

$$x - 3x + 2 = 8$$

$$-2x = 6$$

$$x = -3$$

$$y = 3(-3) - 2$$

$$y = -11$$

$$\boxed{(-3, -11)}$$

$$54. \begin{cases} 3x - 2y = -5 \\ x - 2y = -11 \end{cases}$$

$$\rightarrow \begin{cases} 3x - 2y = -5 \\ -3x + 2y = 5 \end{cases}$$

$$\hline -2x = -6$$

$$-2x = -6$$

$$x = 3$$

$$3(3) - 2y = -5$$

$$-2y = -14$$

$$y = 7$$

$$\boxed{(3, 7)}$$

$$55. \begin{cases} 3x - 2y = -2 \\ 4x - 5y = 1 \end{cases} \Rightarrow \begin{cases} -12x + 8y = 8 \\ 12x - 15y = 3 \end{cases}$$

$$\boxed{\left(\frac{-12}{7}, \frac{-11}{7}\right)}$$

$$\hline -7y = 11$$

$$y = \frac{-11}{7}$$

$$3x + \frac{22}{7} = -2 \quad x = \frac{-36}{7}$$

$$21x + 22 = -14 \quad x = \frac{-12}{7}$$

$$33x = -36$$

$$x = \frac{-12}{7}$$

$$56. \quad z = ax + by$$

$$z - ax = by$$

$$\boxed{\frac{z - ax}{y} = b}$$

$$57. \quad bx = b + y$$

$$bx - b = y$$

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

$$\boxed{b = \frac{y}{x - 1}}$$

$$58. \quad x = \frac{3b + y}{a + b} \Rightarrow x(a + b) = 3b + y$$

$$xa + xb = 3b + y$$

$$xb - 3b = y - xa \rightarrow$$

$$b(x - 3) = y - xa$$

$$\boxed{b = \frac{y - xa}{x - 3}}$$

$$59. \quad 3^{-1} = \boxed{\frac{1}{3}}$$

$$60. \quad 4^{-2} = \frac{1}{4^2} = \boxed{\frac{1}{16}}$$

$$61. \quad x^{-5} = \boxed{\frac{1}{x^5}}$$

$$62. \quad 8^{2/3} = (2^3)^{2/3} = 2^2 = \boxed{4}$$

$$63. \quad (\sqrt[5]{x^2})^5 = (x^{2/5})^5 = \boxed{x^2}$$

$$64. \quad \sqrt{(2x)^2} = (2x)^4 = \boxed{16x^4}$$

$$65. \quad \frac{9^4}{9^2} = 9^2 = \boxed{81}$$

$$66. \quad \sqrt[3]{(25)^4} = (\sqrt[3]{125})^4 = 5^4 = \boxed{625}$$

67. step 1: change all x's to y's and the y to an x.

step 2: solve the new equation for y.

step 3: change the y to $f^{-1}(x)$ once isolated.

$$68. \quad f^{-1}(x)$$

69. i) symmetric with respect to the line $y = x$.

ii) (x, y) on $f(x)$ will be (y, x) on $f^{-1}(x)$

iii) Domain of $f(x)$ is the range of $f^{-1}(x)$ and the range of $f(x)$ is the domain of $f^{-1}(x)$.

iv) $f(f^{-1}(x)) = x$ and $f^{-1}(f(x)) = x$

$$70. x = -\frac{3}{2}y + 2$$

$$x - 2 = -\frac{3}{2}y$$

$$2(x - 2) = -3y$$

$$y = \frac{2(x-2)}{-3} = f^{-1}(x)$$

$$71. x = \sqrt[3]{2y-1} + 4$$

$$x - 4 = \sqrt[3]{2y-1}$$

$$(x-4)^3 = 2y-1$$

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

$$72. x = \frac{7y^2 + 2}{3} - 5$$

$$x + 5 = \frac{7y^2 + 2}{3} \Rightarrow 3(x+5) = 7y^2 + 2$$

$$y = \sqrt{\frac{3(x+5) - 2}{7}} = f^{-1}(x)$$

$$73. d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(1+5)^2 + (5-3)^2}$$

$$d = \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$$

$$74. d = \sqrt{(3-(-3))^2 + (-2-1)^2}$$

$$d = \sqrt{36+9} = \sqrt{45}$$

$$\text{radius is } \sqrt{45} = 3\sqrt{5}$$

$$75. i^{95} = i^3 = -i$$

$$76. \frac{1}{i^5} = \frac{1}{i} \cdot \frac{i}{i} = \frac{i}{-1} = -i$$

$$77. (2+i)^2 = (2+i)(2+i) \\ = 4 + 2i + 2i + i^2 \\ = 4i + 4 - 1 = 3 + 4i$$

$$79. \frac{2+3i}{4i} \cdot \frac{i}{i} = \frac{2i-3}{-4} \\ = \frac{3}{4} - \frac{i}{2} \text{ or } \frac{3}{4} - \frac{1}{2}i$$

$$80. \frac{2}{3-i} \cdot \frac{3+i}{3+i} = \frac{6+2i}{9+1}$$

$$81. \sqrt{-2} \cdot \sqrt{-8}$$

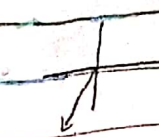
$$= \frac{6+2i}{10}$$

$$i\sqrt{2} \cdot i\sqrt{8}$$

$$= \frac{3}{5} + \frac{1}{5}i$$

$$i^2 \sqrt{16} = -4$$

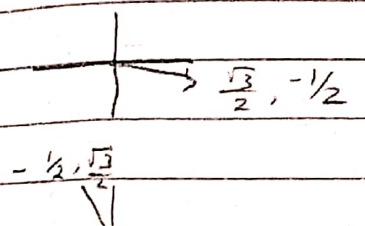
82. $\sin 240^\circ = \frac{-\sqrt{3}}{2}$



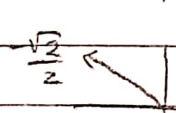
83. $\cos \frac{5\pi}{6} = \frac{-\sqrt{3}}{2}$



84. $\tan \frac{11\pi}{6} = \frac{-1/2}{\sqrt{3}/2} = \frac{-\sqrt{3}}{3}$

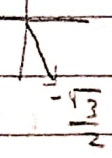


85. $\cot 120^\circ = \frac{-1/2}{\sqrt{3}/2} = \frac{\sqrt{3}}{3}$



86. $\sec \frac{3\pi}{4} = \frac{1}{-1/\sqrt{2}} = \frac{2}{-\sqrt{2}} = \frac{2\sqrt{2}}{-2} = -\sqrt{2}$

87. $\csc \frac{5\pi}{3} = \frac{1}{-\sqrt{3}/2} = \frac{2}{-\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$



88. $\frac{\frac{x-3}{2}}{\frac{x-2}{9} - \frac{2}{3}} = \frac{\frac{x-3}{2}}{\frac{x-6}{9}} = \frac{x-3}{2} \cdot \frac{9}{x-6} = \frac{9(x-3)}{2(x-6)}$

89. SOAP for signs

$(x^3 - 27) = (x - 3)(x^2 + 3x + 9)$

90. $\frac{4u}{16} - \frac{(3u-1)}{16} = \frac{u+1}{16} = \frac{(u+1)(u-4)}{4(3u^2-4)}$
 $\frac{4(3u-1) + (u-4)(3u-1)}{4(u-4)} = \frac{12u-4 + 3u^2-13u+4}{4(u-4)} = \frac{(u+1)(u-4)}{4u(3u-1)}$
 $\frac{u^2-3u-4}{12u^2-4u}$ or $\frac{(u+1)(u-4)}{4u(3u-1)}$