1. Solve $2x - 1 < 12$. $2x < 13$

2. If $f(x) = 3x^2 - 5x + 6$, find:
   a. $f(0)$

   b. $f(-a)$

3. Stephen has 10 coins in his pocket. They have a total value of \$1.90. If the coins are all either quarters or nickels, how many of each does Stephen have? $q + n = 10$, $.25q + .05n = 1.90$

4. a. Find the slope of the graph of $5x - 6y = -9$.
   $-6y = -5x - 9$
   b. Find the y-intercept for this graph. $y = \frac{5}{6}x + \frac{9}{6}$

5. If $f(x) = 3x + 1$ find $f(-2)$ $= 3(-2) + 1$

6. Write the equation of the line passing through $(2, -3)$ and perpendicular to the line $x + 2y = 6$.

7. Solve the system:
$$x - 3y = 7$$
$$2x + 5y = 9$$

8. Factor: $25x^2y - y^3$

9. Factor: $8x^3 - 125y^3$

10. Find the vertex of
    a. $y = 2x^2 + 3x + 7$.

    b. $y = 3(x + 1)^2 - 5$

11. Solve $x^2 - 6x + 7 = 0$.

12. Find the x-intercepts of $y = 3x^2 - 9x + 5$ using the quadratic formula.

13. Simplify and write the result in $a + bi$ form.

    a. $(2 - 7i) + (5 + 4i)$

    b. $(3 - 3i)(3 + 3i)$

    c. $(2+3i)/(1+5i)$

14. Simplify and express without negative exponents.
$$\frac{4x^{-3}y^2}{9x^2y} \cdot \frac{15xy^3}{2x^{-4}y^2}$$

1. $x < 13/2$

2. a. 6

   b. $3a^2 + 5a + 6$

3. 7 quarters, 3 nickels

4. a. $\frac{5}{6}$

   b. $(0, \frac{3}{2})$

5. -5

6. $y = 2x - 7$

7. $\left(\frac{62}{11}, \frac{-5}{11}\right)$

8. $y(5x+y)(5x-y)$

9. $(2x-5y)(4x^2+10xy+25y^2)$

10. a. $\left(-\frac{3}{4}, \frac{47}{8}\right)$

    b. $(-1, -5)$

11. $3 \pm \sqrt{2}$

12. $x = \frac{9 \pm \sqrt{21}}{6}$

13. a. $7 - 3i$

    b. 18

    c. $\frac{17}{26} - \frac{7}{26}i$

14. $\frac{10y^2}{3}$

Simplify.

a. $\sqrt{x^4y^{10}}$

b. $\sqrt[3]{x^3y^6}$

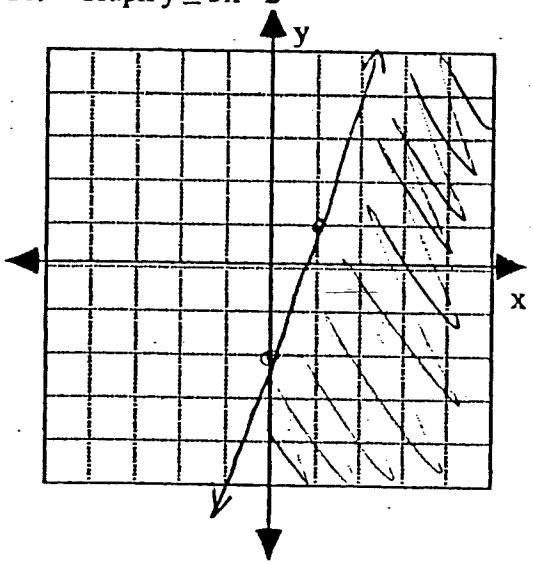
c. $(8x^3y^4)^{2/3}$

d. $\left(\frac{9}{x^4}\right)^{1/2}$

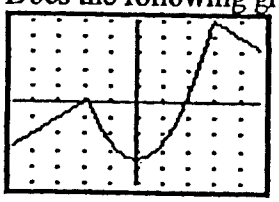
16. Add and simplify: $\frac{-8}{x+5}+\frac{5}{x+2}$

17. Solve: $\frac{4}{2x-1}=\frac{3}{x-7}$

18. Graph $y \le 3x - 2$



19. Does the following graph represent a function? Why?



15.

a. $|x^2y^5|$

b. xy^2

c. $4x^2y^{8/3}$ or $4x^2y^2\sqrt[3]{y^2}$

d. $\frac{3}{x^2}$

16. $\frac{-3x+9}{(x+5)(x+2)}$

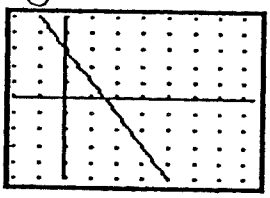
17. $x = -\frac{25}{2}$

18. see graph

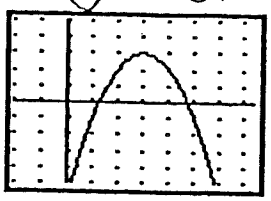
19. yes, passes the vertical line test

20. Write the equation for each of the following graphs. Each mark on the graph represents one unit.

$y = -2x+3$



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



College Algebra Review for Final – KEY

1. a) slope $= \dfrac{(3035-1075)}{(8-15)} = \dfrac{1960}{-7} = -280$; Jim's balance is decreasing by \$280 per week.

   b) $y = mx + b$
   $y = -280x + b$
   $3035 = -280(8) + b$
   $5275 = b$; Jim's balance was \$5275 in week 0 or when he lost all sources of income.

   c) $M = -280w + 5275$

   d) $M = -280(4) + 5275$
   $M = \$4155$

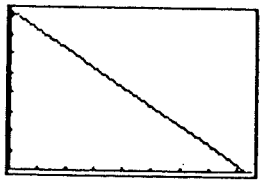
2. slope $= \dfrac{-40}{2} = -20$; The point (0,1660) is in the table, the y-intercept is 1660: $y = -20x + b$
   $R = -20t + 1660$

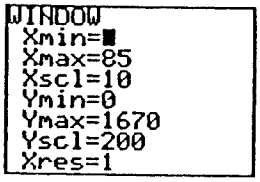
   b) y-intercept = 1660

   x-intercept:
   $0 = -20x + 1660$
   $-1660 = -20x$
   $83 =$ x-intercept

   c) y-intercept: There were 1660 billion barrels of oil in 1976.
   x-intercept: Oil reserves will be gone 83 years after 1976 or in 2059.

   d)



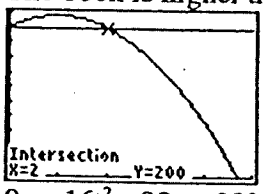


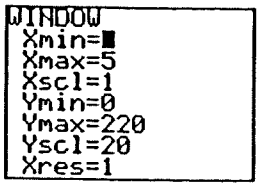
3. $3x^2 + 7x - 1 = 0$
   $a = 3, b = 7, c = -1$
   $$x = \frac{-7 \pm \sqrt{7^2 - 4(3)(-1)}}{2(3)} = \frac{-7 \pm \sqrt{61}}{6} \cong -2.468 \text{ and } 0.135$$

4. $y = (x + 2)(x + 5)$ or $y = x^2 + 7x + 10$

5. $x = -8$ or 1.5

6. a) The book is higher than 200 feet when $0 < t < 2$.





   b) $0 = -16t^2 + 32t + 200$

$$t = \frac{-32 \pm \sqrt{32^2 - 4(-16)(200)}}{2(-16)} = \frac{-32 \pm \sqrt{13824}}{-32} \Rightarrow t \cong 4.67 \text{ seconds}$$ ($t = -2.67$ is not in the domain)

c) Maximum occurs at the vertex. Vertex x-coordinate $= \frac{-b}{2a} = \frac{-32}{2(-16)} = 1$ second

vertex y-coordinate $= -16(1)^2 + 32(1) + 200$
$= 216$ feet

d) for graph see part a)

7. maximum occurs at the vertex. Vertex x-coordinate $= \frac{-b}{2a} = \frac{-34}{2(-0.04)} = 425$ lbs.

vertex y-coordinate $= -0.04(425)^2 + 34(425)$
$= \$7225$

The company should sell 425 pounds of chocolate to maximize its revenue. The maximum revenue is $7225.

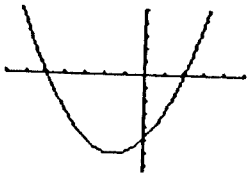
8.

a) x-intercepts:
$(x+5)(x-2) = 0$
$(x+5)=0$ or $(x-2)=0$
$x=-5$ or $x=2$

b) y-intercept:
"c" = y-intercept
$-10 = c$
$(0, -10)$ is the y-intercept

c) In vertex form, $y = \frac{-b}{2a}$, the vertex is $(x_v=-3/2, y_v=-49/4)$

d)



```
WINDOW
 Xmin=-7
 Xmax=5
 Xscl=1
 Ymin=-15
 Ymax=10
 Yscl=2
 Xres=1
```

9. Table: No, because an input of 3 has two different outputs.
Graph: Yes, the graph passes the vertical line test.

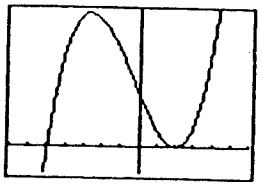
10. a) This is a cube root graph shifted two units right. The equation is: $y = \sqrt[3]{x-2}$
b) This is the absolute value graph shifted 3 units left and 2 units down.
The equation is $y = |x + 3| - 2$

11. $f(5) = 11$

12. $g(-2) = 2(-2)^3 - 5(-2) + 1 = -16 - 20 + 1 = -35$

13. a) $f(7) \cong 2.75$
b) $x \cong 2$
c) domain: $x \geq 0$ or $[0, \infty)$
d) range: $f(x) \geq 0$ or $[0, \infty)$

14.



15. a) degree is 5
    b) at the ends this function will go in opposite directions with the left end going down and the right end going up
    c) x-intercepts will occur at $x = 7$ and $x = -2$
    d) at $x=7$, the graph will "wiggle" at the x-axis like x^3 and at $x=-2$, the graph will "bounce off" the x-axis like x^2

16. $P(x) = -(x+3)(x^3)(x-4)^2$

17. a) $C(40) = \dfrac{65(40)}{100-40} = \dfrac{2600}{60} = 43.3$ thousand or \$43,300

    b) Solve: $87 = \dfrac{65p}{100-p}$

    $87(100-p) = 65p$
    $8700 - 87p = 65p$
    $8700 = 152p$
    $57.2 = p$ They can immunize 57.2%.

    c)

```
WINDOW
 Xmin=0
 Xmax=100
 Xscl=10
 Ymin=0
 Ymax=1000
 Yscl=100
 Xres=1
```

18. a) $4^p = y$
    b) $\log_h(t) = 5$
    c) $x = \log_r(7)$
    d) $x^2 = 25;\ x = 5$
    e) $10^2 = x + 14;\quad 100 = x + 14;\quad 86 = x$
    f) $4e^{7x+1} = 12$
    $e^{7x+1} = 3$
    $LN(3) = 7x + 1$
    $1.0986 = 7x + 1$
    $0.0986 = 7x$
    $0.014 = x$

19. a) $P(t) = 45000(1.06)^t$

b) 1998 = 28 years after 1970; $P(28) = 45000(1.06)^{28}$; $p(28) = 230{,}026$ people

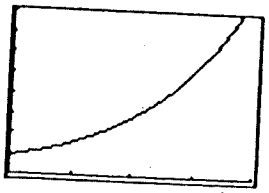
c) solve: $80000 = 45000(1.06)^t$

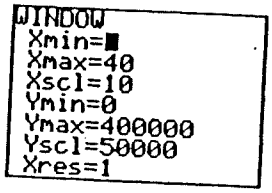
$1.7778 = (1.06)^t$

$\log_{1.06}(1.7778) = t$

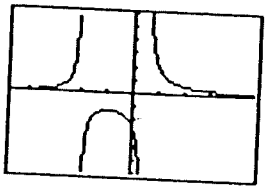
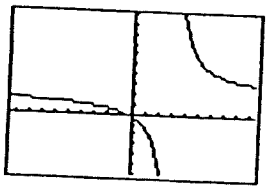
$\dfrac{\log(1.7778)}{\log(1.06)} = t$; $9.87 = t$ or 9.87 years after 1970 or sometime in late 1979

d)





20.

For $\dfrac{x+5}{(2x-1)(x+2)}$		For $\dfrac{2x+1}{x-3}$
y = 0 (degrees of demon. >)	Horizontal asymptotes	y = 2 (degrees equal)
$x = \dfrac{1}{2}$ and x = -2	Vertical asymptotes	x = 3
x = -5	x-intercept(s)	$X = \dfrac{-1}{2}$
	Graph	

21. a) (10,1) (15,10) (20,100) (25,1000)

b) $y = \sqrt[3]{4x+1}$; $x = \sqrt[3]{4y+1}$; $x^3 = 4y + 1$; $\dfrac{x^3-1}{4} = y$ or $f^{-1}(x) = \dfrac{x^3-1}{4}$

22. Square root graph, shifted 3 to the left, stretched by 5, reflected, shifted 6 up.