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: $y = -20x + b$

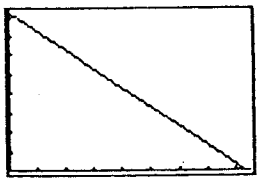
   $R = -20t + 1660$

   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)



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WINDOW
 Xmin=
 Xmax=85
 Xscl=10
 Ymin=0
 Ymax=1670
 Yscl=200
 Xres=1
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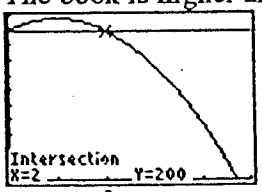
3. $3x^2 + 7x - 1 = 0$
   $a = 3, b = 7, c = -1$

   $$x = \frac{-7 \pm \sqrt{7^2 - 4(3)(-1)}}{2(3)} = \frac{-7 \pm \sqrt{61}}{6} \cong -2.468 \text{ and } 0.135$$

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 $0 < t < 2$.

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WINDOW
 Xmin=
 Xmax=5
 Xscl=1
 Ymin=0
 Ymax=220
 Yscl=20
 Xres=1
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   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.

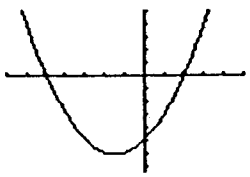
8.

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.

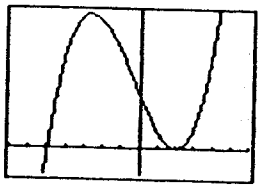
10. a) This is a cube root graph shifted two units right. The equation is: $y = \sqrt[3]{x-2}$
b) This is the absolute value graph shifted 3 units left and 2 units down.
The equation is $y = |x + 3| - 2$

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

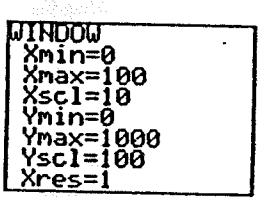
17. a) $C(40) = \dfrac{65(40)}{100-40} = \dfrac{2600}{60} = 43.3$ thousand or \$43,300

   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)



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

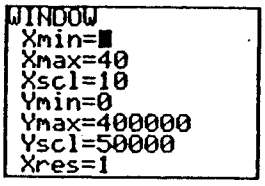
c) solve: $80000 = 45000(1.06)^t$

$1.7778 = (1.06)^t$

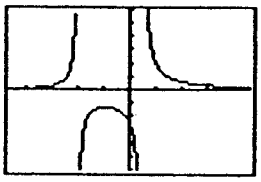
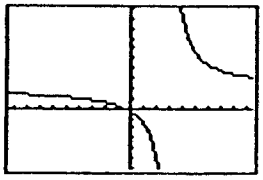
$\log_{1.06}(1.7778) = t$

$\dfrac{\log(1.7778)}{\log(1.06)} = t$; 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.