

**Math 111**  
**Final Exam Answers**

1. (a)  $x = 2$
- (b)  $t = \frac{7 \pm \sqrt{41}}{2}$  (First step: Multiply both sides by  $t$ . Use the quadratic formula to solve.)
- (c)  $x = 15$  (Isolate the root and then take both sides to the fourth power to solve for  $x$ .)

2. (a)  $x$ -intercept:  $(-4, 0)$  (Solve  $h(x) = 0 \Rightarrow 2x^2 + 16x + 32 = 0$ )

(b) Horizontal Asymptote:  $y = \frac{2}{3}$

Vertical Asymptotes:  $x = \sqrt{3}, x = -\sqrt{3}$  (Solve  $3x^2 - 9 = 0$ )

3. Monthly payment = \$1572.29 (Use the Present Value Formula for Annuities)

4. Yes, you will have enough.

After 10 years, you will have saved \$18,578.59 (Use the Future Value Formula for Annuities), but your debt will only be \$16,288.95 (Use the Compound Interest Formula.).

5. (a)  $C = 1500 + 7q$

(b) No, you will not make a profit.

Your revenue will be  $14(150) = 2100$  dollars, but your cost is  $1500 + 7(150) = 2550$  dollars.

So, you are losing \$450 if you sell 150 cars.

6. (a) Domain: All real numbers

Range:  $y \geq -36$

(Note that the graph of  $f(x)$  is a parabola that opens up with vertex  $(3, -36)$ .)

(b) Points:  $(-1, 28), (7, 28)$  (Solve  $f(x) = 28$ )

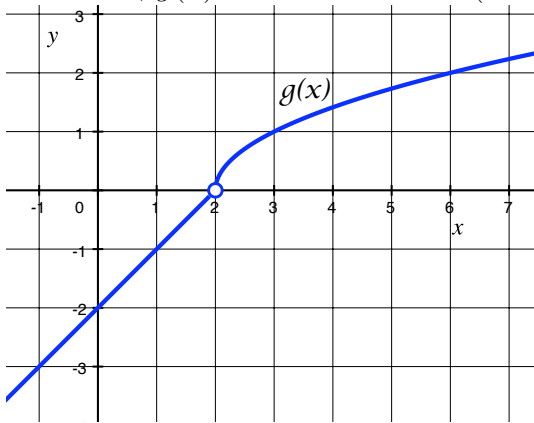
(c)  $\frac{f(x+h)-f(x)}{h} = 8x + 4h - 24$  Remember:  $f(x+h) = 4(x+h)^2 - 24(x+h)$

7. (a) Effective Rate =  $(1 + \frac{0.09}{12})^{12} - 1 \approx 0.093807$  or 9.3807%
- (b) Principal = \$2605.49 (Solve  $10,000 = P(1 + \frac{0.09}{12})^{12(15)}$ .)
- (c) Time  $\approx 7.7305$  years (Solve  $2 = (1 + \frac{0.09}{12})^{12t}$ .)

8. (a) Since  $g(3) = \sqrt{3-2} = 1$ ,  $g(g(3)) = g(1) = 1 - 2 = -1$

So,  $g(g(3)) + 5 = 4$ .

- (b) For  $x < 2$ ,  $g(x)$  is a line of slope 1 with  $y$ -intercept  $(0, -2)$ .  
 For  $x > 2$ ,  $g(x)$  is a root function (same as  $\sqrt{x}$  shifted right by 2).



- (c) We are looking for an  $x$ -value for which  $g(x) = 10$ .  
 $g^{-1}(10) = 102$  since  $g(102) = 10$ .

(Solve  $10 = \sqrt{x-2} \Rightarrow x = 102$  and  $10 = x-2 \Rightarrow x = 12$  (Problems with domain).)

9. (a) Domain:  $x < 10$  (Must have  $10 - x > 0$ )
- (b) Domain:  $x \neq 0, x \neq -13$
- (c) Domain: All real numbers