

## Practice Test 3 Solutions

1.  $0 = x^2 - 49$   
 $0 = (x+7)(x-7)$

x-intercepts:  $x = 7, x = -7$

2. maximum height occurs at the vertex

x-coordinate of vertex  $= -\frac{b}{2a} = \frac{-64}{2(-16)} = 2$  ← maximum height occurs at 2 seconds.

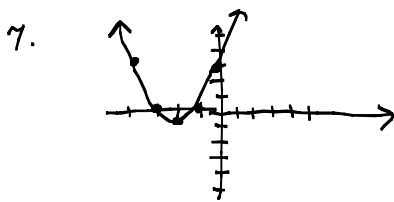
y-coord of vertex  $= h(2) = -16(2)^2 + 64(2) + 70 = 134$  ft.

3.  $(-5+i)(-6-8i) = 30 + 40i - 6i - 8i^2 = 30 + 34i - 8(-1) = 30 + 34i + 8 = 38 + 34i$

4.  $f(x) = x(x+8)$

5.  $5i - (1-i) = 5i - 1 + i = -1 + 6i$

6.  $\frac{8+3i}{5+4i} \cdot \frac{5-4i}{5-4i} = \frac{40-32i+15i-12i^2}{25-16i^2} = \frac{40-17i-12(-1)}{25-16(-1)} = \frac{40-17i+12}{41}$   
↖  
 FOIL =  $\frac{52-17i}{41}$

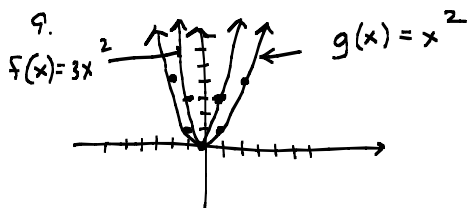


8.  $(x+2)^2 = -9$

$\sqrt{(x+2)^2} = \pm\sqrt{-9}$

$x+2 = \pm 3i$

$x = -2 \pm 3i$



10.  $a = 4$     $b = -20$     $c = 19$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-20) \pm \sqrt{(-20)^2 - 4(4)(19)}}{2(4)} = \frac{20 \pm \sqrt{400}}{8} = \frac{20 \pm 20}{8} = \frac{20 \pm 4\sqrt{6}}{8} = \frac{5 \pm \sqrt{6}}{2}$

11.  $G(t) = 5t^2 - t - 6$

$G(t) = (5t-6)(t+1)$

$5t-6=0$        $t+1=0$   
 $\quad \quad \quad +6 \quad +6$        $\quad \quad \quad =1 \quad =1$

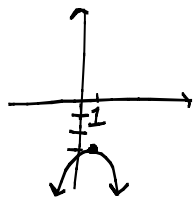
$\frac{5t}{5} = \frac{6}{5}$   
 $t = \frac{6}{5}$

$t = -1$

12. Find the vertex and sketch.

x-coordinate of vertex =  $-\frac{b}{2a} = \frac{-1.2}{2(-0.6)} = 1$

y-coordinate of vertex =  $f(1) = -0.6(1)^2 + 1.2(1) - 3.6 = -3$

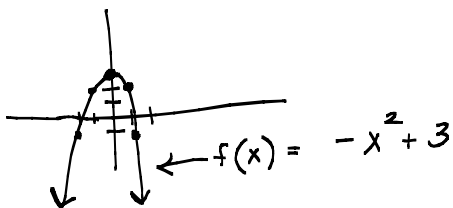


Opens down since  $a < 0$ .

increasing:  $(-\infty, 1)$

decreasing:  $(1, \infty)$

13.



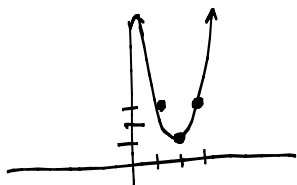
14.  $f(x) = x^2 + 4x + 4 + 8 - 4$

$f(x) = (x+2)(x+2) + 4$

$f(x) = (x+2)^2 + 4$

Vertex:  $(-2, 4)$   
 axis of symmetry:  $x = -2$

15.



x-coordinate of vertex =  $-\frac{b}{2a} = \frac{-(-5)}{2(2)} = \frac{5}{4} = 2$   
 y-coordinate of vertex =  $f(2) = 1$

opens up

x	f(x)
0	9
1	3
3	3
4	9

← Compute several additional points to get the shape

16.

$0 = 4t^2 - 2t + 9$

Use the quadratic formula.  $a = 4, b = -2, c = 9$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(4)(9)}}{2(4)} = \frac{2 \pm \sqrt{4 - 144}}{8} = \frac{2 \pm \sqrt{-140}}{8} = \frac{2 \pm 2i\sqrt{35}}{8}$$

$$= \frac{2}{8} \pm \frac{2i\sqrt{35}}{8} = \frac{1}{4} \pm \frac{\sqrt{35}i}{4}$$

$$17. \quad x^2 + 3x + \frac{9}{4} = 4 + \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)\left(x + \frac{3}{2}\right) = \frac{25}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = \frac{25}{4}$$

$$\sqrt{\left(x + \frac{3}{2}\right)^2} = \pm \sqrt{\frac{25}{4}}$$

$$x + \frac{3}{2} = \pm \frac{5}{2}$$

$$x = -\frac{3}{2} \pm \frac{5}{2} \rightarrow x = 1, x = -4$$

$$18. \quad \sqrt{-20} = \sqrt{-1(4)(5)} = 2i\sqrt{5}$$

$$19. \quad 0 = -16t^2 + 46t + 45$$

$$x = \frac{-46 \pm \sqrt{46^2 - 4(-16)(45)}}{2(-16)} = \frac{-46 \pm \sqrt{4996}}{-32} = 3.6 \text{ seconds}$$

$$20. \quad \text{discriminant} = b^2 - 4ac = 10^2 - 4(25)(4) = -4000$$

↑  
negative discriminant  
⇒ no real solutions

$$21. \quad f(-2.9) = -3$$

$$f(4) = 4$$

$$f\left(\frac{1}{3}\right) = 0$$

$$22. \quad |x-2| + 3 = 8$$

$$|x-2| = 5$$

$$x-2 = 5 \quad \text{or} \quad x-2 = -5$$

$$x = 7 \quad \text{or} \quad x = -3$$

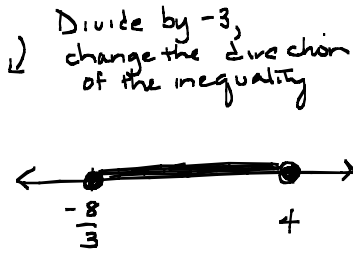
23.  $|2-3x| \leq 10$

$$\begin{array}{c} -10 \leq 2-3x \leq 10 \\ \underline{-2} \quad \underline{-2} \quad \underline{-2} \end{array}$$

$$-12 \leq -3x \leq 8$$

$$4 \geq x \geq -\frac{8}{3}$$

$$\left[-\frac{8}{3}, 4\right]$$



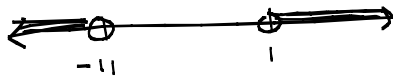
24.  $\left|\frac{x+5}{2}\right| > 3$

$$\frac{x+5}{2} < -3 \quad \text{or} \quad \frac{x+5}{2} > 3$$

Multiply both sides to clear the fraction.

$$x+5 < -6 \quad \text{or} \quad x+5 > 6$$

$$x < -11 \quad \text{or} \quad x > 1 \quad (-\infty, -11) \cup (1, \infty)$$



25.  $f(x) = \begin{cases} \sqrt{x} & 0 \leq x \leq 4 \\ -x+1 & 4 < x < 6 \\ -1 & x \geq 6 \end{cases}$

$$\begin{array}{r} x f(x) \\ 0 \mid 0 \\ 4 \mid 2 \end{array}$$

$$\begin{array}{r} x f(x) \\ 6 \mid -1 \end{array}$$

$$\begin{array}{r} x f(x) \\ 4 \mid -3 \\ 6 \mid -5 \end{array}$$

Note that I am plugging in the endpoints (4 and 6) but they're not actually in the interval

