Adv. Alg II (H)

Midyear Review #4

1) $f(-\sqrt{4}+5) = f(7) = \frac{7+7}{2} = \frac{14}{2} = \boxed{7}$

2) $h(f(-6))$

$f(-6) = \frac{-6+7}{2} = \frac{1}{2}$

$h(\frac{1}{2}) = \frac{1}{2}+4 = \boxed{4\frac{1}{2} \text{ or } \frac{9}{2}}$

3) $g(f(x))$

$g(\frac{x+7}{2}) = \sqrt{\frac{x+7}{2}} + 5$

$= \frac{\sqrt{x+7}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} + 5$

$= \boxed{\frac{\sqrt{2x+14}}{2} + 5}$

4) $f(h(x))$

$f(x+4) = \frac{(x+4)+7}{2}$

$= \boxed{\frac{x+11}{2}}$

5) $\frac{f(x+w)+f(x)}{w}$

$\frac{\frac{x+w+7}{2} + \frac{x+7}{2}}{w}$

$\frac{\frac{x+w+7+x+7}{2}}{\frac{w}{1}}$

$\frac{2x+w+14}{2} \cdot \frac{1}{w}$

$\boxed{\frac{2x+w+14}{2w}}$

6) $\frac{x+7}{2} = 12$

$x+7 = 24$

$\boxed{x = 17}$

7) $k(h(x)) = 15$

$k(x+4) = 15$

$|x+4| = 15$

$x+4 = 15$ or $x+4 = -15$

$\boxed{x = 11 \qquad x = -19}$

II see graph paper

III

1) $f(x) = \frac{1}{x+1}$ $\quad x \neq -1$ $\quad D: (-\infty,-1) \cup (-1,\infty)$

2) $f(x) = |x+3|$ $\quad D: (-\infty,\infty)$

3) $f(x) = \begin{cases} x, & x \leq 0 \\ -2, & x > 0 \end{cases}$ $\quad D: (-\infty,\infty)$

4) $y = [\![x-3]\!]$ $\quad D: (-\infty,\infty)$

5) $f(x) = \begin{cases} -1, & x < -3 \\ 0, & x = -3 \\ 1, & x \geq 4 \end{cases}$ $\quad D = (-\infty,-3] \cup [4,\infty$

IV

1) $R = [0,\infty)$

2) $R = [0,\infty)$

3) $R = [0,\infty)$

4) $R = [0] \cup [1,\infty)$

Problem Solving

1) $0 = -0.65x^2 + 4.5x$

$0.65x^2 - 4.5x = 0$

$x(0.65x - 4.5) = 0$

$x = 0 \qquad 0.65x = 4.5$

$x = \boxed{6.923076923 \text{ ft}}$ ← horizontal distance

max height

$x = \frac{-4.5}{2(-0.65)} = \frac{-4.5}{-1.3} = 3.461538462$

$y = -0.65(3.461538462)^2 + 4.5(3.461538462)$

$= \boxed{7.788461538 \text{ ft}}$ ← max

2) $wx^2 + 2x = 4$

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

$b^2 - 4ac < 0$

$4 - 4(w)(-4) < 0$

$4 + 16w < 0$

$16w < -4$

$w < \frac{-4}{16}$

$\boxed{w < -\frac{1}{16}}$

3) $y - 6 = a(x+2)^2$

$-4 - 6 = a(3+2)^2$

$-10 = a(5)^2$

$-10 = 25a$

$\frac{-10}{25} = a$

$a = \frac{-2}{5}$

$\boxed{y - 6 = -\frac{2}{5}(x+2)^2}$

4) Let $x$ = # of \$2 increases

new price $= 12 + 2x$

new patrons $= 1000 - 100x$

$I = (12+2x)(1000-100x)$

$= 12000 - 1200x + 2000x - 200x^2$

$I - 12000 = -200x^2 + 800x$

$I - 12800 = -200(x^2 - 4x + 4)$ (−800)

$I - 12800 = -200(x-2)^2$

$(2, 12800)$

price $= 12 + 2(2)$

$= 12 + 4 = \boxed{\$16}$

max income $\boxed{\$12800}$

5) Let $x$ = # of \$1 increases

new price $= 4 + x$

# of people $= 500 - 50x$

$I = (4+x)(500-50x)$

$= 2000 - 200x + 500x - 50x^2$

$I - 2000 = -50x^2 + 300x$

$-450 + I - 2000 = -50(x^2 - 6x + 9)$

$I - 2450 = -50(x-3)^2 \rightarrow (3, 2450)$

new price $= 4 + 3 = \boxed{\$7}$

max income $\boxed{\$2450}$

6) $h = -16t^2 + vt + s$

$6 = -16t^2 + 56t + 2$

$16t^2 - 56t + 4 = 0$

$4t^2 - 14t + 1 = 0$

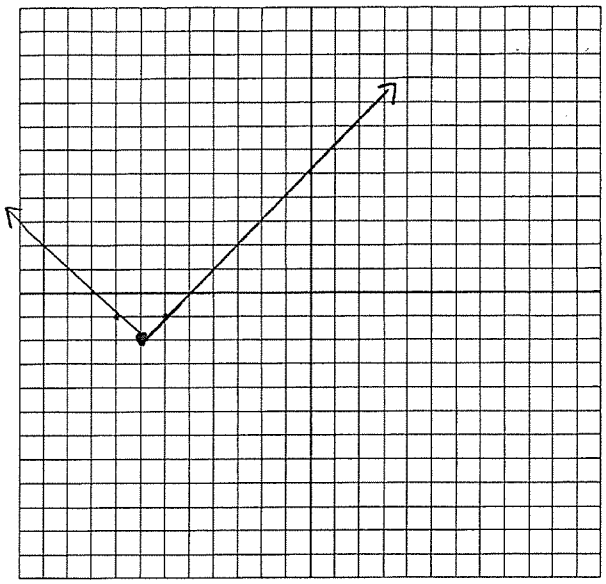
$t = \frac{14 \pm \sqrt{196 - 4(4)(1)}}{8}$ (16)

$= \frac{14 \pm \sqrt{180}}{8}$

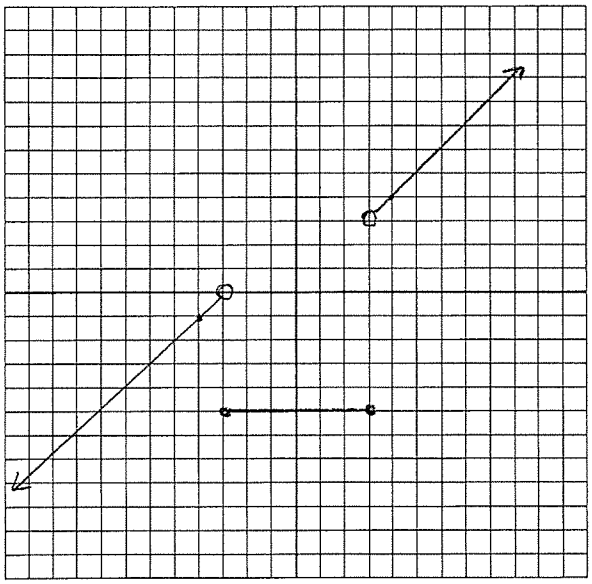
$\boxed{t = 2.177705 \text{ s}}$, $0.0722449 \text{ s}$

↑ on it's way up

II Graph

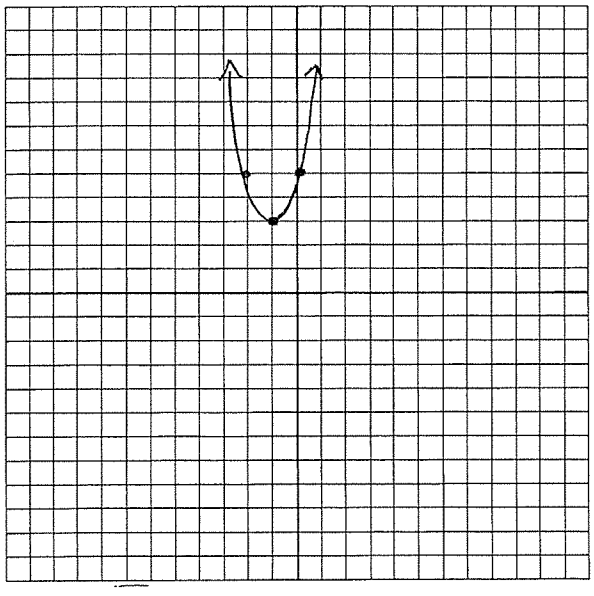


1) $f(x) = |x+7| - 2$



2) $f(x) = \begin{cases} x, & x > 3 \\ -5, & |x| \leq 3 \\ x+3, & x < -3 \end{cases}$ $\leftarrow -3 \leq x \leq 3$

| | x | y |
|---|---|---|
| ① | 3 | 3 |
| ② | -3 | -5 |
| | 3 | -5 |
| ③ | -3 | 0 |



3) $y = 2x^2 + 4x + 5$

$+2 \quad +y-5 = 2(x^2+2x+1)$

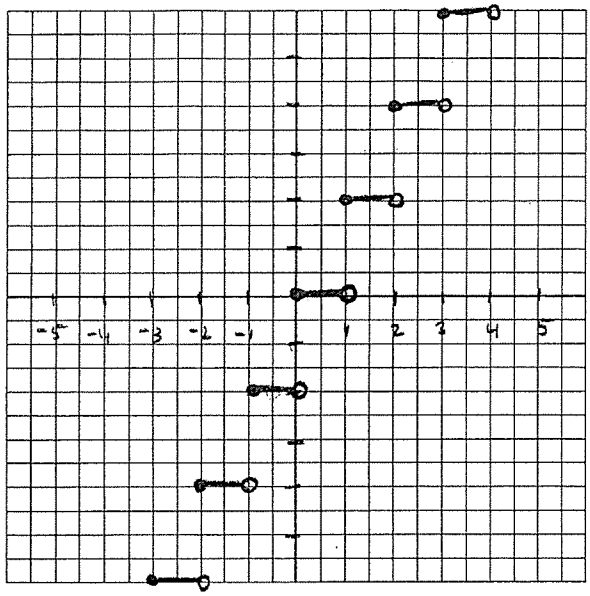
$y - 3 = 2(x+1)^2$

ver $(-1, 3)$

y-int $(0, 5)$

symm pt $(-2, 5)$

axis of symm $x = -1$.




4) $y = 2[\![x]\!]$