

Name: Solution

Date: 6, 6, 07

- 1) A ball is thrown into the air with a velocity of 30 feet per second, its height in feet after  $t$  seconds is given by  $y = 30t - 16t^2$

$t$	$y$
2	-4
2.5	-25

- a) Find the average velocity for the time period beginning when  $t = 2$  and lasting (3 Pts)

i) 0.5 s      Avg Velocity =  $\frac{-25 + 4}{2.5 - 2} = \frac{-21}{0.5} = -42 \frac{\text{ft}}{\text{sec}}$

$t$	$y$
2	-4
2.05	-5.74

j) 0.05 s      Avg Velocity =  $\frac{-5.74 + 4}{2.05 - 2} = -34.8 \frac{\text{ft}}{\text{sec}}$

k) 0.01 s      Avg Velocity =  $\frac{-4.7416 + 4}{2.01 - 2.00} = -34.16 \frac{\text{ft}}{\text{sec}}$

$t$	$y$
2	-4
2.01	-4.3416

- b) Find the instantaneous velocity when  $t = 2$  (1 Pt)

$v = -34.00 \text{ ft/sec}$

- 2) Find the inverse of the following functions. (Must Show All the Appropriate Steps) (6 points)

a)  $y = \sqrt[3]{x+3} + 6$

$y - 6 = \sqrt[3]{x+3}$

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

$x = (y - 6)^3 - 3$

$f^{-1}(x) = (x - 6)^3 - 3$

b)  $f(x) = \frac{2x+5}{x-4}$

$\frac{y}{1} = \frac{2x+5}{x-4}$

$xy - 4y = 2x + 5$

$xy - 2x = 4y + 5$

$x(y - 2) = 4y + 5$

$x = \frac{4y + 5}{y - 2} \Rightarrow f^{-1}(x) = \frac{4x + 5}{x - 2}$

(3 Points)

3) If  $f(x) = 5x + \log(x+10)$ , find  $f^{-1}(1)$

$$1 = 5X + \log(X+10)$$

$$\text{let } Y_1 = 1 \quad Y_2 = 5X + \log(X+10)$$

$$X = 0$$

(3 points)

4) Express the function  $F(x) = \frac{1}{\sqrt{x+\sqrt{x}}}$

as a composition of three functions (namely  $(f \circ g \circ h)(x)$ ).

(Hint: Find  $f(x)$ ,  $g(x)$ , and  $h(x)$  so that  $(f \circ g \circ h)(x) = \frac{1}{\sqrt{x+\sqrt{x}}}$ )

Answers vary

For Example let

$$f(x) = \frac{1}{x}$$

$$g(x) = \sqrt{x+\sqrt{x}}$$

$$h(x) = x$$

Solve the following algebraically:

(4 points)

a)  $2^x - 8^x = 0$

$$2^x = 8^x$$

$$2^x = 2^{3x}$$

$$x = 3x$$

$$2x = 0$$

$$x = 0$$

b)  $e^{x^2} = (e^{5x}) \cdot \frac{1}{e^{-6}}$

$$e^{x^2} = e^{5x+6}$$

$$x^2 = 5x + 6$$

$$x^2 - 5x - 6 = 0$$

$$(x-6)(x+1) = 0$$

$$x = 6$$

$$x = -1$$