Serial #: _____   ID _____ NAME _____

Show all necessary steps for full marks.

Question 1: (5 points) (2.8 Example 8):   Find the inverse of the function $f(x) = \dfrac{x^5 - 3}{2}$

Solution:

$$y = \frac{x^5 - 3}{2}$$

$$x = \frac{y^5 - 3}{2}$$

$$2x = y^5 - 3$$

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

$$y = \sqrt[5]{2x + 3}$$

$$f^{-1}(x) = \sqrt[5]{2x + 3}$$

Question 2: (5 points) (2.8 Exercise 62): Find the inverse of the function $f(x) = x^2 + x$, $x \geq -\dfrac{1}{2}$

with its domain.

Solution: $y = x^2 + x$, $x \geq -\dfrac{1}{2}$

$$y = x^2 + x$$

$$= x^2 + x + \left(\frac{1}{2}\right)^2 - \frac{1}{4}$$

$$= \left(x + \frac{1}{2}\right)^2 - \frac{1}{4}$$

$$y = \left(x + \frac{1}{2}\right)^2 - \frac{1}{4}, \quad x \geq -\frac{1}{2}, \quad y \geq -\frac{1}{4}$$

$$x = \left(y + \frac{1}{2}\right)^2 - \frac{1}{4}, \quad y \geq -\frac{1}{2}, \quad x \geq -\frac{1}{4}$$

$$x + \frac{1}{4} = \left(y + \frac{1}{2}\right)^2$$

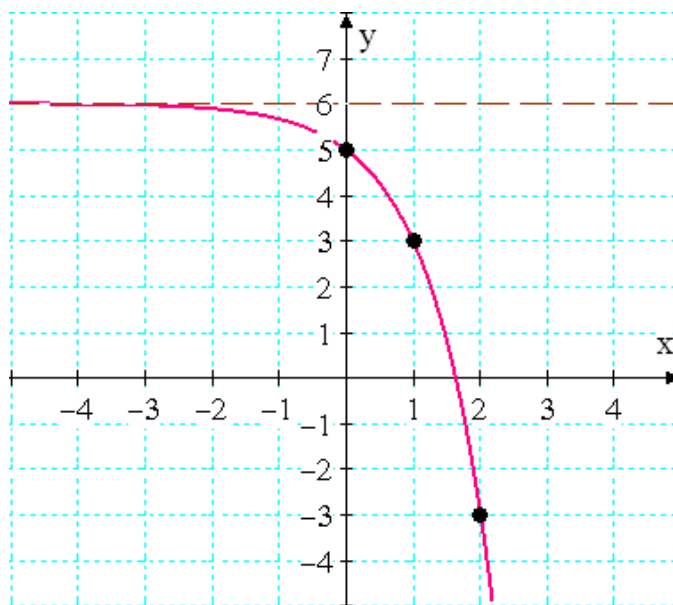$$y + \frac{1}{2} = \sqrt{x + \frac{1}{4}} \quad \text{Since } y + \frac{1}{2} \geq 0$$

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

$$f^{-1}(x) = -\frac{1}{2} + \sqrt{x + \frac{1}{4}}, \quad x \geq -\frac{1}{4}$$

Question 3: (5 points) (4.1 Exercise 34): Graph the function $h(x)=6-3^x$ and state its **domain**, **range** and **asymptote**.

Solution: $h(x)=6-3^x$

Domain $=(-\infty,\infty)$ Asymptote: $y=6$ Range $=(-\infty,6)$

Question 4: (5 points) (4.2 Exercise 8): Given $f(x)=e^{-x}-3$. Graph the function by starting from the graph of $y=e^x$. State the **domain**, **range**, and **asymptote**.

Solution: $f(x)=e^{-x}-3$ Domain $=(-\infty,\infty)$ Asymptote: $y=-3$ Range $=(-3,\infty)$