Homework 7

6.3 #30 $\quad 2\pi \int_0^2 \frac{y}{1+y^2}\,dy$

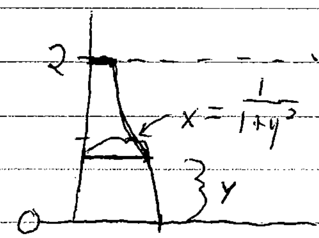
$$2\pi \int_0^2 y \cdot \left(\frac{1}{1+y^2}\right) dy$$

y ↑ radius $\quad$ $\left(\frac{1}{1+y^2}\right)$ ↑ height of shell

The integral represents the volume of the solid obtained by rotating the region bounded by

$$x = \frac{1}{1+y^2}, \quad x = 0, \quad y = 0, \quad y = 2$$

about the x-axis.



6.5 #10 (a) $\quad f(x) = \sqrt{x} \quad [0,4]$

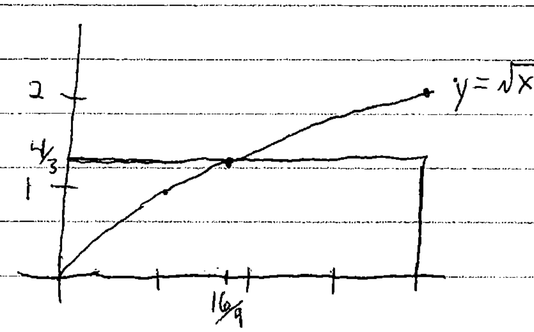
$$f_{ave} = \frac{1}{4-0}\int_0^4 \sqrt{x}\,dx = \frac{1}{4} \cdot \frac{2}{3} x^{3/2}\Big|_0^4$$

$$= \frac{4}{3}$$

(b) Find c such that $f(c) = f_{ave}$

$$\sqrt{c} = \frac{4}{3} \Rightarrow c = \frac{16}{9}$$

(c)



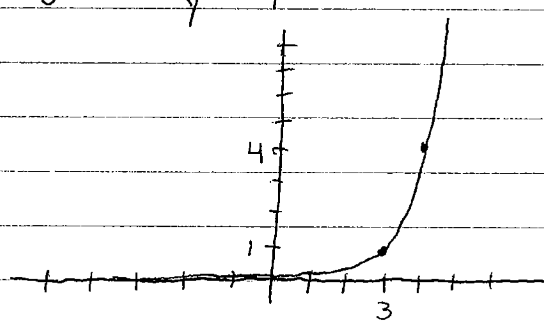
7.1 #26 $f(x) = y = 2x^3 + 3$

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

$$\frac{y-3}{2} = x^3 \quad \Rightarrow \quad x = \sqrt[3]{\frac{y-3}{2}}$$

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

7.2 #8 $y = 4^{x-3}$



16. (a) $g(t) = \sin(e^{-t})$

$\sin x$ has domain = {all real numbers}

e^{-t} has domain = {all real numbers}

Therefore, $g(t) = \sin(e^{-t})$ has domain = {all real #'s}

(b) $g(t) = \sqrt{1-2^t}$

$\sqrt{1-2^t}$ is defined only when $1 - 2^t \geq 0$

i.e. when $2^t \leq 1$, so when $t \leq 0$

Domain of $g = (-\infty, 0]$