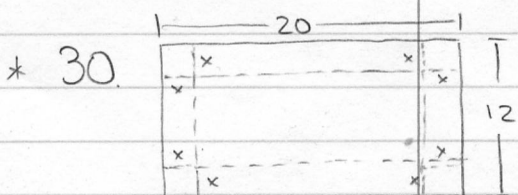


2.7 cont'd

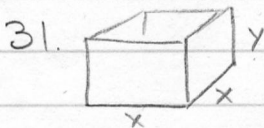
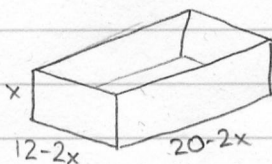


a) $V(x) = x(12-2x)(20-2x)$

b) $V(x) > 200 \text{ m}^3$ when $1.174 < x < 3.898$

c) Max volume at $x = 2.427$

Max volume is $V(2.427) = 262.687$



$V = x^2 y = 12$, so $y = \frac{12}{x^2}$

a) $S(x) = 2xy + 2xy + x^2 = 4xy + x^2$

$= x^2 + 4x \left(\frac{12}{x^2}\right)$

$= x^2 + \frac{48}{x}$

b) Minimal area at $x = 2.884$ ($x = 23^{1/3}$)

$y = 1.442$

END OF ASSIGNMENT

2.8

3. $f+g = \sqrt{1+x^2} + \sqrt{1-x}$

Domain: $x \leq 1$

$f-g = \sqrt{1+x^2} - \sqrt{1-x}$

Domain: $x \leq 1$

$fg = \sqrt{(1+x^2)(1-x)}$

Domain: $x \leq 1$

$f/g = \frac{\sqrt{1+x^2}}{\sqrt{1-x}}$

Domain: $x < 1$

4. $f+g = \sqrt{9-x^2} + \sqrt{x^2-1}$

Domain: $[-3, -1] \cup [1, 3]$

$f-g = \sqrt{9-x^2} - \sqrt{x^2-1}$

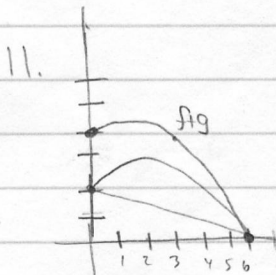
"

$fg = \sqrt{(9-x^2)(x^2-1)}$

Domain: "

$f/g = \frac{\sqrt{9-x^2}}{\sqrt{x^2-1}}$

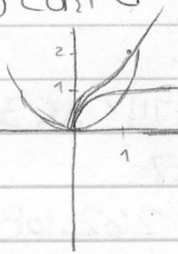
Domain: $[-3, -1] \cup [1, 3]$



14.

2.8 cont'd

14.



$x^2, \sqrt{x}; x^2 + \sqrt{x}$

17. $f(g(0)) = f(2) = 1 = f(2)$

18. $f(f(4)) = f(7) = 16$

25. $(g \circ f)(4) = g(f(4)) = g(2) = 5$

26. $f(g(0)) = f(3) = 0$

37. $(f \circ g)(x) = \frac{2x-1}{2x}$ Domain: $x \neq 0$

$(g \circ f)(x) = 2\left(\frac{x}{x+1}\right) - 1$ Domain: $x \neq -1$

$(f \circ f)(x) = \frac{\frac{x}{x+1}}{\frac{x}{x+1} + 1} = \frac{x}{x+x+1} = \frac{x}{2x+1}$ Domain: $x \neq -\frac{1}{2}$

$(g \circ g)(x) = 2(2x-1) - 1 = 4x - 3$ Domain all real numbers

39. $(f \circ g)(x) = \sqrt[3]{\sqrt[4]{x}} = (x^{\frac{1}{4}})^{\frac{1}{3}} = x^{\frac{1}{12}} = \sqrt[12]{x}$ Domain: $x \geq 0$

$(g \circ f)(x) = \sqrt[4]{\sqrt[3]{x}} = \sqrt[12]{x}$

$(f \circ f)(x) = \sqrt[3]{\sqrt[3]{x}} = \sqrt[9]{x}$

$(g \circ g)(x) = \sqrt[4]{\sqrt[4]{x}} = \sqrt[16]{x}$

Domain: $(-\infty, \infty)$

Domain: $x \geq 0$

49. $H(x) = |1-x^3| = (f \circ g)(x)$ where $g(x) = 1-x^3$ and $f(x) = |x|$

or $g(x) = x^3$ and $f(x) = |1-x|$

55. $r(t) = 60t$ } $\Rightarrow (A \circ r)(t) = \pi(r(t))^2 = \pi(60t)^2 = 3600\pi t^2$
 $A(r) = \pi r^2$

60. a) $s(d) = \sqrt{1^2 + d^2} = \sqrt{d^2 + 1}$

b) $d(t) = 350t$

c) $(s \circ d)(t) = \sqrt{(350t)^2 + 1} = \sqrt{122500t^2 + 1}$

2.9

3. Yes one-to-one

5. No not one-to-one

6. Yes one-to-one

13. No $f(-1) = f(1) = 6$

14. Yes one-to-one

18. a) $f^{-1}(18) = 5$

b) $f(2) = 4$

19. $3 = 5 - 2x$, so $x = 1$. Thus $f^{-1}(3) = 1$

Lecture 3

2.9

24. $(f \circ g)(x) = \frac{3 - (3 - 4x)}{4} = \frac{4x}{4} = x$

$(g \circ f)(x) = 3 - 4\left(\frac{3-x}{4}\right) = 3 - 3 + x = x$

27. $(f \circ g)(x) = (\sqrt{x+4})^2 - 4 = x + 4 - 4 = x$

$(g \circ f)(x) = \sqrt{(x^2-4)+4} = \sqrt{x^2} = x$

39. $y = \frac{1+3x}{5-2x}$

$(5-2x)y = 1+3x$

$5y - 2xy = 1 + 3x$

$5y = 1 + 3x + 2xy = 1 + (3+2y)x$

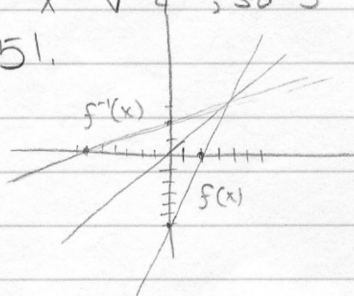
$x = \frac{5y-1}{2y+3}$, so $f^{-1}(x) = \frac{5x-1}{2x+3}$

40. $f(y) = 5 - 4x^3$

$x^3 = \frac{y-5}{-4} = \frac{5-y}{4}$

$x = \sqrt[3]{\frac{5-y}{4}}$, so $f^{-1}(x) = \sqrt[3]{\frac{5-x}{4}}$

51.



$y = 3x - 6$

$\frac{y+6}{3} = x$, so $f^{-1}(x) = \frac{x+6}{3}$