Section 1.3

8. $2m-1+3m+5=6m-8$

$5m+4=6m-8$ ($-5m$ at both side, $+8$ at both side)

$12=m$

$m=12$

(10) 10. $(x+2)(x+1)=x^2+11$ (-4/algebra error) (0 pts if answer is not justified).

$x^2+3x+2=x^2+11$ (x^2 cancelled out)

$3x+2=11$ (-2 at both side)

$3x=9$ (divide 3 at both side)

$x=3$

12. $\frac{x}{3}+\frac{2x}{5}=\frac{-11}{5}$ (multiple both side by 15)

$5x+6x=-33$

$11x=-33$ (divide both side by 11)

$x=-3$

(10) 14. $\frac{x-1}{4}+\frac{2x+3}{-1}=0$ (multiple both side by 4)

(-4/algebra error) (0pts if answer is not justified)

$x-1-4(2x+3)=0$

$x-1-8x-12=0$

$-7x-13=0$ (divide both side by 7)

$x=-\frac{13}{7}$

16 $\frac{1}{y} + 1 = \frac{3}{y} - \frac{1}{2y}$ (multiple both side by $2y$)

$2 + 2y = 6 - 1$ (-2 for both side)

$2y = 3$ (divide both side by 2)

$y = 3/2$

18 $\frac{1}{x-5} + \frac{1}{x+5} = \frac{2x+1}{x^2-25}$ (multiple both side by x^2-25)

$x+5 + x-5 = 2x+1$

$2x = 2x+1$ (minus $2x$ for both side)

$0 = 1$ ← no answer for x

20. $\frac{3}{2x+1} - \frac{4}{x+1} = \frac{2}{2x^2+3x+1}$ (multiple both sides by $2x^2+3x+1$)

$3(x+1) - 4(2x+1) = 2$

$3x+3-8x-4 = 2$

$-5x - 1 = 2$ (add 1 to both side)

$-5x = 3$

$x = -\frac{3}{5}$

22. a) $\frac{2}{3x} = \frac{3}{x}$

$9x = 2x$

$7x = 0$

$x = 0$ but since x is in the denominator, it can not be 0, this question has no answer.

b) $\frac{2}{3x} = \frac{3}{x+1}$

$2x+2 = 9x$

$2 = 7x$

$x = \frac{2}{7}$

(10) c) $\frac{2}{3x} = \frac{3}{x} + 1$ (multiple both sides by $3x$)

$2 = 9 + 3x$ (-9 for both sides)

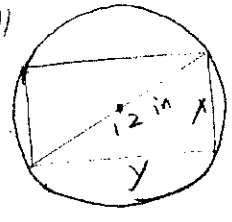
$-7 = 3x$ (divide 3 for both sides)

$x = -\frac{7}{3}$

(-4/algebra error
0 pts if answer not justified)

Section 4.4

2 a)



$\sqrt{x^2+y^2} = 12$

$x^2+y^2 = 12^2$

$y^2 = 12^2 - x^2$

$y = \sqrt{12^2 - x^2}$

perimeter: $L = 2(x+y)$

$= 2(x+\sqrt{12^2-x^2})$

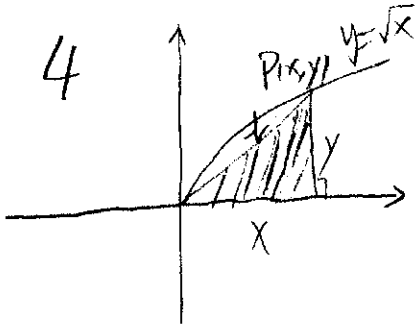
$0 < x < 12$

b) $S = xy$

$= x \times \sqrt{12^2-x^2}$

$= x\sqrt{12^2-x^2}$ $\quad 0 < x < 12$

(20) 4



possible partial credit

a) $S = \frac{1}{2} \times y$ [3]

$y = \sqrt{x}$ [3]

$\Rightarrow S = \frac{1}{2} x \cdot x^{\frac{1}{2}} = \frac{1}{2} x^{\frac{3}{2}}$ [4]

[10]

b) perimeter $= x + y + \ell$

$y = \sqrt{x}$ [3]

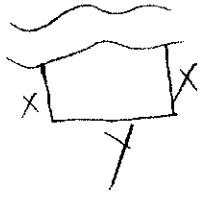
$\ell = \sqrt{x^2+y^2} = \sqrt{x^2+x}$ [3]

$\Rightarrow$ perimeter $= x + \sqrt{x} + \sqrt{x^2+x}$ [4]

Possible partial credit

[10]

(26) 22.



area $= xy$

$2x + y = 500 \Rightarrow y = 500 - 2x$

$\Rightarrow$ area $= x \times (500 - 2x) = 500x - 2x^2$

[5 pts] for writing Area = Length × width

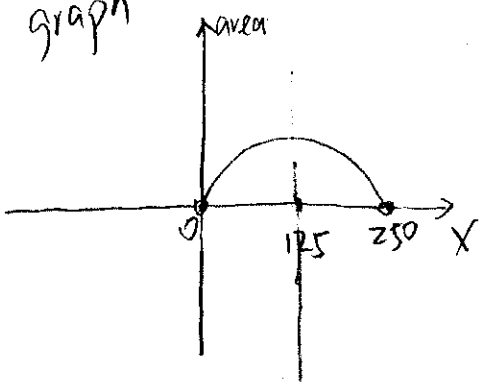
[5 pts] for putting it all together.

Possible partial credit:

[5 pts] for writing condition on perimeter = 500

[5 pts] for deducing length of side

graph



[4] pts for graph

[2] pts for discussion (maximum is ...)

when the X value is 125 the area reaches its maximum value of $2 \times 125^2 = 31250$

(when X value is 0 or 250, the area reaches its minimum value of 0.)

Homework #4 Sections 3.5, 3.6, 4.2 Due Monday 10/26/09

Section 3.5: 2, 10, 14, 16, 28

2. Combinations of functions.

(a) $(f*h)(x) = f(x)*h(x) = (2x-1)(x^3) = 2x^4 - x^3$ **<-Ans**

(b) $(h/f)(x) = h(x)/f(x) = x^3/(2x-1)$ **<-Ans**

(c) $(f/h)(1) = f(1)/h(1) = 1/1 = 1$ **<-Ans**

12

10. Composites of functions: $f(x)=1-2x^2, \quad g(x)=x+1$

[2] (a) $(f\circ g)(x) = f(x+1) = 1-2(x+1)^2 = 1-2(x^2+2x+1) = -2x^2-4x-1$ **<-Ans**

[2] (b) $(f\circ g)(1) = f(-1+1) = f(0) = 1$ **<-Ans**

[2] (c) $(g\circ f)(x) = g(1-2x^2) = 1-2x^2+1 = -2x^2+2$ **<-Ans**

[2] (d) $(g\circ f)(-1) = g(-1) = -1+1 = 0$ **<-Ans**

[2] (e) $(f\circ f)(x) = f(1-2x^2) = 1-2(1-2x^2)^2 = 1-2(1-4x^2+4x^4) = -8x^4+8x^2-1$ **<-Ans**

[2] (f) $(g\circ g)(-1) = f(0) = 0+1 = 1$ **<-Ans**

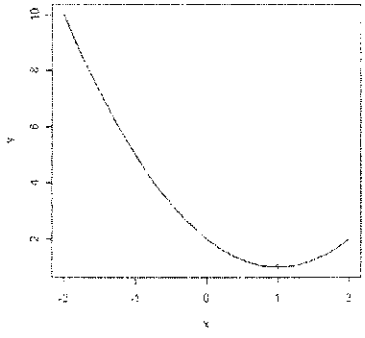
14. Let $f(x)=(1/x^2)+1, \quad g(x)=1/(x-1)$

(a) $(f\circ g)(x) = f(1/(x-1)) = \dfrac{1}{\left(\dfrac{1}{x-1}\right)^2}+1 = \dfrac{(x-1)^2}{1}+1 = x^2-2x+2$ or $(x-1)^2 + 1$ **<-Ans**

(b) First we note that x=1 is not in the domain of g(x) and is therefore not in the domain of the composite function. For all other values of x, g(x) is not zero. Hence these values are in the domain of f(g(x)).

Domain of $f\circ g = (-\infty,1)\cup(1,\infty)$ **<-Ans**

(c) Graph of the function $f\circ g$:



The open circle around the point (1,1) is there to indicate it is a point where the function is not defined.

16. Let $f(x)=x^5, \quad g(x)=x+1, \quad F(x)=(x+1)^5$. Which of the following is true for all x: $F(x)=(f\circ g)(x)$ $F(x)=(g\circ f)(x)$?

We note that it is $F(x)=(f\circ g)(x)$ *since* $f(g(x))=f(x+1)=(x+1)^5$ **<-Ans**