Written assignments to hand in.

Section 2.8

40, 56

Due Monday 10/30

Discussion Problems From the department syllabus

These are ~~not to~~ hand in.

Practice Problems for Exam 2 posted on course website.

WebAssign

Sections 2.7 + 2.8

Due Monday 10/30, 9pm

Exam 2 will be covering

1.6-1.8, 2.1-2.8

Tuesday 10/31

Section 2.1

69 $f(x) = \dfrac{3}{\sqrt{x-4}}$ Find the domain.

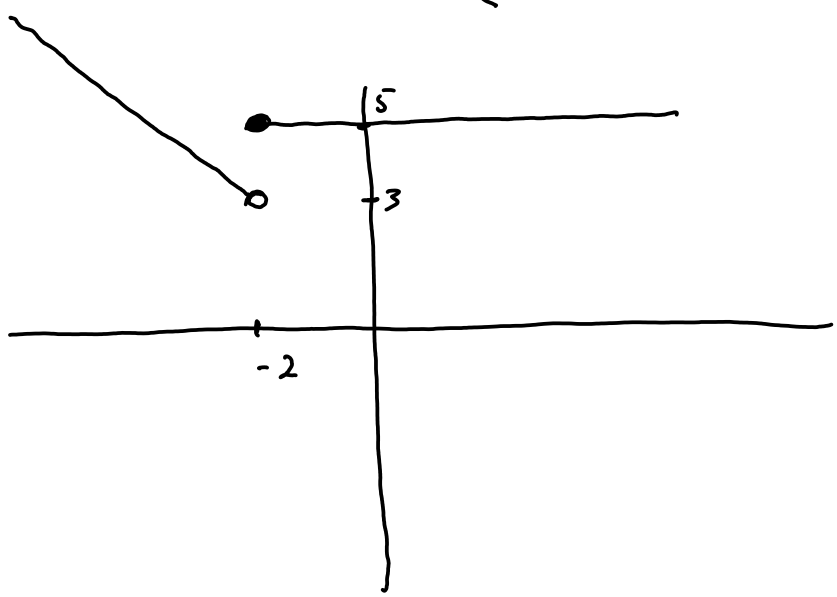
$x-4$ needs to not be negative and not be zero

So $x-4>0$

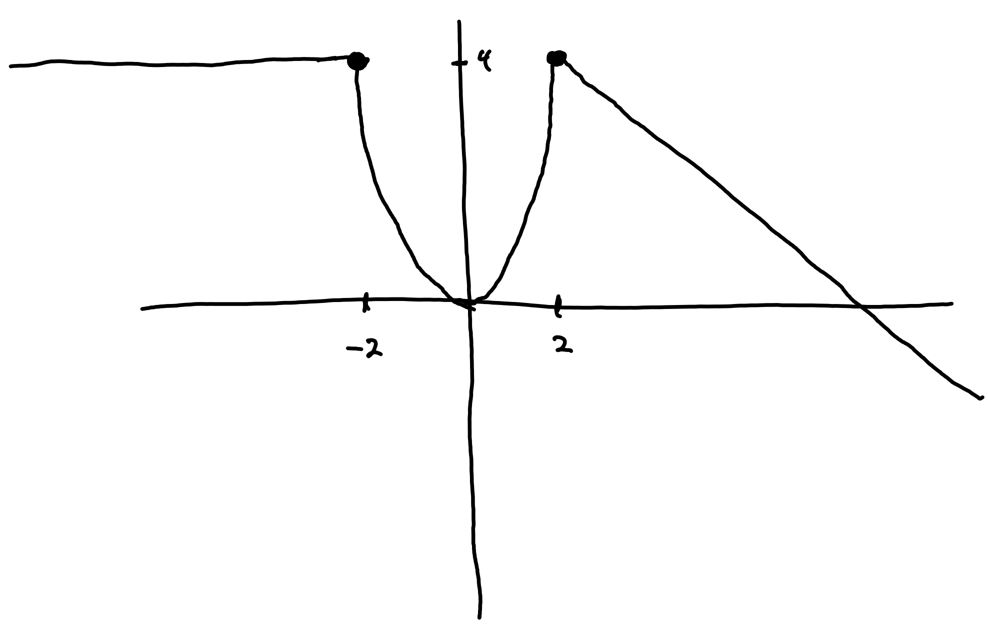
$\boxed{x>4}$

Section 2.2 36, 45

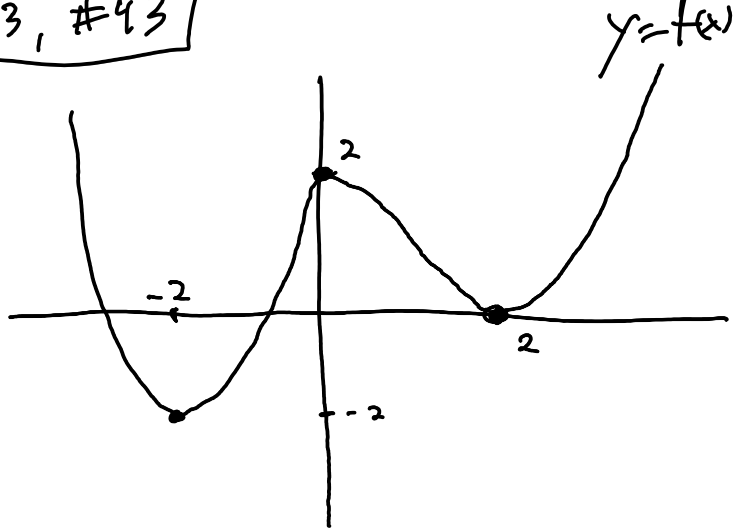
(36) Graph the function $f(x) = \begin{cases} 1-x & \text{if } x < -2 \\ 5 & \text{if } x \geq -2 \end{cases}$



(45) $f(x) = \begin{cases} 4 & \text{if } x < -2 \\ x^2 & \text{if } -2 \leq x \leq 2 \\ -x+6 & \text{if } x > 2 \end{cases}$



$\boxed{2.3, \#43}$



State intervals of increase/decrease for $f(x)$.

State local max/min values and where those values occur.

local max occur at $x=0$, max value $y=f(x)=2$

local min's occur at $x=-2, 2$, min values $y=f(x)=-2, 0$

intervals of increase $(-2,0) \cup (2,+\infty)$

intervals of decrease $(-\infty,-2) \cup (0,2)$

2.4

(17) $f(x) = x^3 - 4x^2$ find net change and average rate of change for $f(x)$ between $x=0$ to $x=10$.

$$\underset{0 \le x \le 10}{\text{Net change}} = f(10) - f(0) = (10^3 - 4 \cdot 10^2) - (0^3 - 4 \cdot 0^2)$$

$$= 1000 - 400 - 0 = 600$$

$$\text{Avg rate of change } 0 \le x \le 10 = \frac{f(10) - f(0)}{10 - 0} = \frac{600}{10} = 60$$

give $\boxed{\#15}$ a try on your own

2.5

41 balloon filled w/ hydrogen at a rate of $0.5 \frac{ft^3}{s}$

Initially the balloon contains $2\ ft^3$ of hydrogen.

(a) Find a linear function $V(t)$ = volume of hydrogen at $t \geq 0$ seconds.

$V(t) = mt + b\ ft^3$ where m = rate of change $\frac{ft^3}{s}$

b = initial condition $V(0)$.

$$V(t) = 0.5t + 2$$

(b) Capacity is $15\ ft^3$. How long to fill?

$$15 = 0.5t + 2$$

$$2\,(13 = 0.5t)$$

$$\boxed{26 \text{ seconds} = t}$$

(49) May cost \$380 for 480 miles.

June cost \$460 for 800 miles.

(a) find $C(x)$ in dollars for x in miles.

Assuming $C(x)$ is linear.

$C(x) = mx + b$ dollars

m = slope = rate of change in $\frac{\$}{\text{mile}}$

$$= \frac{380 - 460}{480 - 800} = \frac{-80}{-320} = \frac{1}{4} = 0.25$$

$\frac{\text{change in } y \text{ in dollars}}{\text{change in } x \text{ in miles}}$

$C(x) = .25x + b$

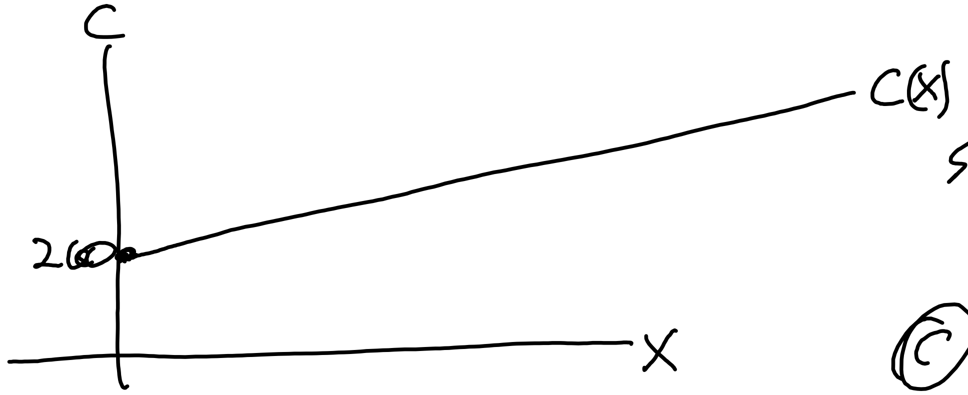
$380 = .25(480) + b$

$380 = 120 + b$

$260 = b$

$$\boxed{C(x) = .25x + 260}$$

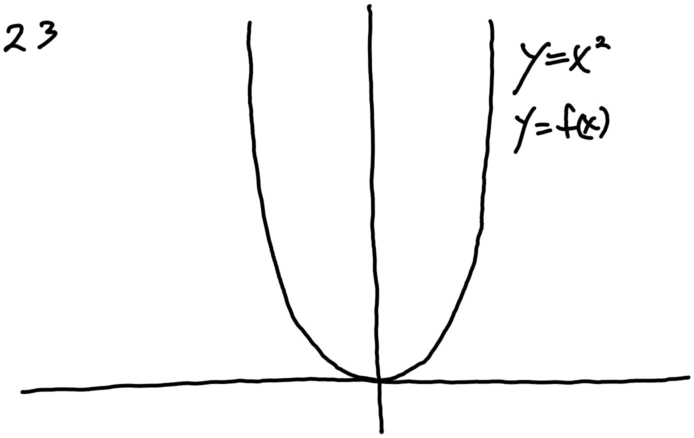
(b)



slope $= .25 = \frac{1}{4}$

(c) Cost increases 25¢/mile.

2.6 #23



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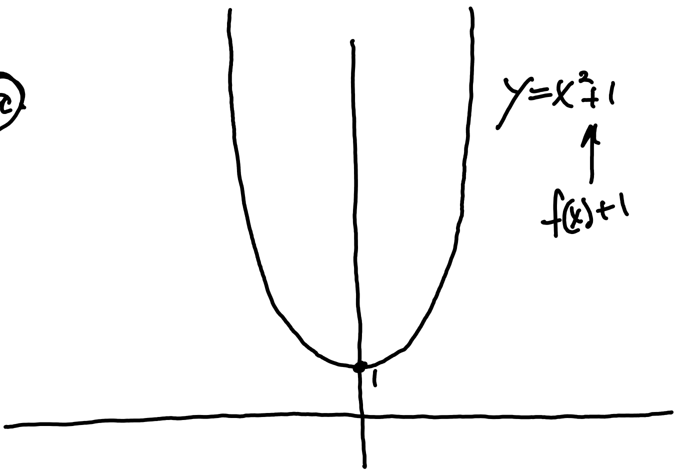

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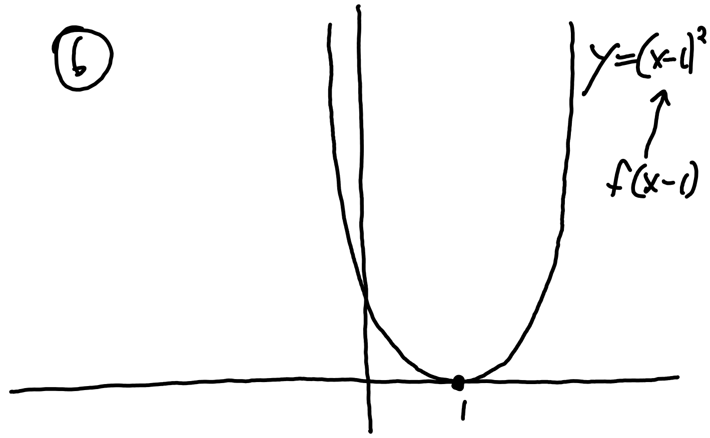

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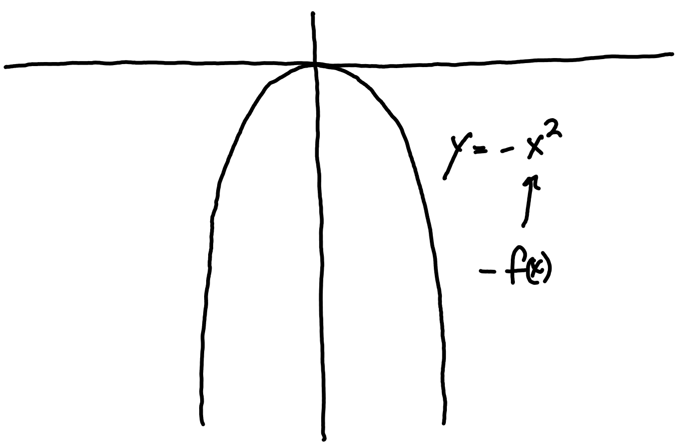

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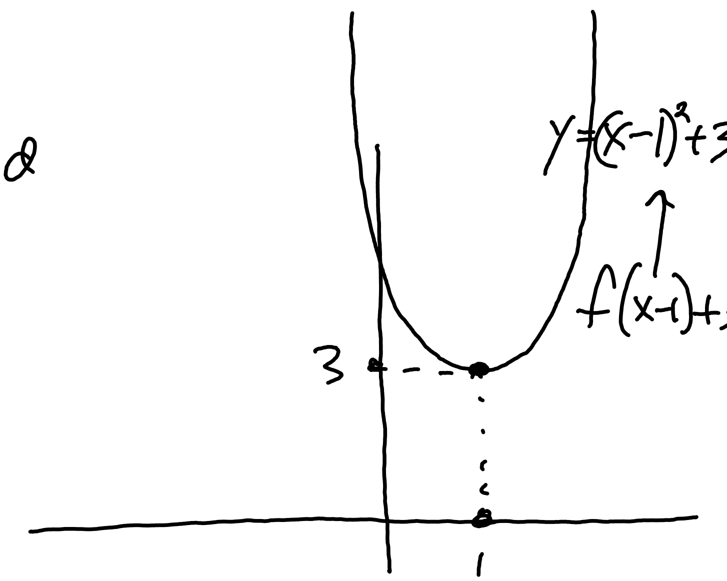

$\boxed{2.7 \# 55}$ $f(x)=\frac{x}{x+1}$ $g(x)=2x-1$ find $f\circ g$, $g\circ f$, $f\circ f$, $g\circ g$.

$$(f\circ g)(x)=f(g(x))=f(2x-1)=\frac{(2x-1)}{(2x-1)+1}=\boxed{\frac{2x-1}{2x}}$$

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

$$(f\circ f)(x)=f(f(x))=f\left(\frac{x}{x+1}\right)=\frac{\left(\frac{x}{x+1}\right)}{\left(\frac{x}{x+1}\right)+1}=\frac{\frac{x}{x+1}}{\frac{x}{x+1}+\frac{x+1}{x+1}}=\frac{\frac{x}{x+1}}{\frac{2x+1}{x+1}}$$

$$=\frac{x}{\cancel{x+1}}\cdot\frac{\cancel{x+1}}{2x+1}=\boxed{\frac{x}{2x+1}}$$

$$(g\circ g)(x)=g(g(x))=g(2x-1)=2(2x-1)-1=4x-2-1=\boxed{4x-3}$$

2.8

(49) $f(x)=3x+5$ This function is one-to-one, find $f^{-1}(x)$.

$$y=3x+5$$

$$x=3y+5$$

$$x-5=3y$$

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

$$\boxed{f^{-1}(x)=\frac{x-5}{3}}$$

(57) $f(x) = \frac{2x+3}{1-5x}$ This is one-to-one, find $f^{-1}(x)$.

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

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

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

$$-3 + 5xy \qquad +5xy - 3$$

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

$$x - 3 = (2+5x)\,y$$

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

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