MATH 1 SOLUTIONS TO HW2

P.2. #62 a) Equation of the line that passes through $(-6,4)$ and parallel to $3x+4y=7$

$3x+4y=7 \Rightarrow y=-\frac{3}{4}x+\frac{7}{4} \Rightarrow$ slope $=-\frac{3}{4}$ (b/c parallel)

Then $y=-\frac{3}{4}x+b$. Plug in $(-6,4)$.

$4=-\frac{3}{4}\cdot(-6)+b \Rightarrow 16=18+4b \Rightarrow b=\frac{-1}{2}$.

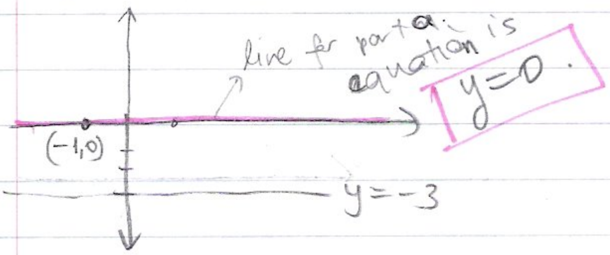
Equation of the line we are looking for is then $\boxed{y=-\frac{3}{4}x-\frac{1}{2}}$

b) Equation of the line through $(-6,4)$ and perpendicular to $3x+4y=7$.
The slope of the line we are looking for is $\frac{4}{3}$ (negative reciprocal of $-\frac{3}{4}$)
Then $y=\frac{4}{3}x+b$

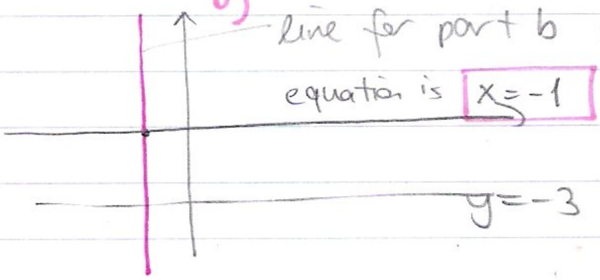
Plug in $(-6,4) \Rightarrow 4=\frac{4}{3}(-6)+b \Rightarrow 4=-8+b \Rightarrow b=12$

Equation of the line we are looking for is $\boxed{y=\frac{4}{3}x+12}$

#64 a) Equation of the line through $(-1,0)$, parallel to $y=-3$



b)



#78. Reimbursement. \$150 for lodging and meals (each day), 34¢ per mile.

$\boxed{\text{Cost of a day} = 150+0.34X \text{ where } X = \text{miles driven}}$

When $x=137$, Cost $=150+0.34(137)$

$\boxed{\text{Cost} = 196.58 \text{ dollars}}$

#98. It is not possible for two lines with positive slopes to be perpendicular to each other.
If m_1 and m_2 are the slopes, to be perpendicular we need to have $m_1 m_2=-1$.
Then $m_2=-\frac{1}{m_1}$. If m_1 is positive m_2 is definitely negative.

P. 3 #20. $f(x) = \sqrt{x^2-3x+2}$

Domain of $f(x)$: $x^2-3x+2 \geq 0$

$(x-1)(x-2) \geq 0$

	$-\infty$	1		2	∞
$x-1$	$-$	0	$+$		$+$
$x-2$	$-$		$-$	0	$+$
$(x-1)(x-2)$	$+$	0	$-$	0	$+$

↳ True when $-\infty < x \leq 1$ or $2 \leq x < \infty$

So, Domain of $f(x)$ is $(-\infty, 1] \cup [2, \infty)$

#22. $h(x) = \dfrac{1}{\sin x - \frac{1}{2}}$ ⇒ all real numbers − x values where $\sin x - \frac{1}{2} = 0$.

$\sin x = \frac{1}{2}$ ⇒ $x = \frac{\pi}{6} + k \cdot 2\pi$ or $x = \frac{5\pi}{6} + k \cdot 2\pi$ where k is an integer.

So, Domain of $h(x)$ is $\boxed{\mathbb{R} - \{\frac{\pi}{6} + k2\pi \text{ where } k \text{ is an integer}\} - \{\frac{5\pi}{6} + k2\pi \text{ where } k \text{ is an integer}\}}$

#24. $g(x) = \dfrac{1}{|x^2-4|}$ ⇒ need to have $|x^2-4| \neq 0$

⇒ $x^2-4 \neq 0$ ⇒ $x \neq 2$ or $x \neq -2$

Domain of $g(x)$ is $\boxed{\mathbb{R} - \{2, -2\}}$

#58. $f(x) = \sin(x)$, $g(x) = \pi x$

a) $f(g(2)) = f(\pi 2) = \sin(2\pi) = 0$

b) $f(g(\frac{1}{2})) = f(\pi \cdot \frac{1}{2}) = \sin(\frac{\pi}{2}) = 1$

c) $f(g(0)) = f(\pi \cdot 0) = \sin(0) = 0$

d) $g(f(\frac{\pi}{4})) = g(\sin\frac{\pi}{4}) = g(\frac{\sqrt{2}}{2}) = \frac{\pi\sqrt{2}}{2}$

e) $f(g(x)) = \sin(\pi x)$

f) $g(f(x)) = \pi(\sin x)$

#62 $f(x) = \frac{1}{x}$

$g(x) = \sqrt{x+2}$

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

$(g \circ f)(x) = g(f(x)) = g(\frac{1}{x}) = \sqrt{\frac{1}{x} + 2}$ Domain $x \neq 0$ and $\frac{1+2x}{x} > 0$

↳ make a sign chart

$\boxed{(-\infty, \frac{-1}{2}) \cup (0, \infty)}$

The domains of fog and gof are different

The functions fog and gof are not equal

#64. $r(t)$ = radius of the ripple after t seconds $= 0.6t$

Area of the circle $= A = \pi r^2 = \pi(0.6t)^2$

$A(t) = 0.36\pi t^2$ → area of the ripple circle after t seconds.

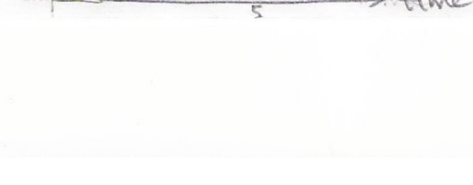
#84. a) $d(t)$ = depth of water after t seconds

As time passes the depth of water increases so d is a function of t

b) Domain: $0 \leq t \leq 5$ because the vase gets filled after 5 seconds

Range $0 \leq d(t) \leq 30$ because the vase is 30 cm tall.

c)



First increase slowly then faster because the vase is wider on the lower part