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~~Test Upload~~

Assignment for Module 1 Calculus

4) a) $f(-4) = -2$ b) $f(x) = g(x)$ at $x = \{-2, 2\}$
 c) $f(x) = -1$ when $x \approx \{-3, 4\}$
 d) $[-4, 0]$
 e) domain $= [-4, 4]$ range $= [-2, 3]$
 f) domain $= [-4, 3]$ range $= [0.5, 4]$

8) yes, it is a function of x, passes vertical line test,
 domain $= [-2, 2]$ range $= [-1, 2]$

10) no, not a function, does not pass vertical line test, the function seems to assign multiple values to x. at $x = 0$, $f(x)$ takes on all values between -1 and 0

27) replace x with $(3+h)$ first;
$f(3+h) = 4 + 3(3+h) - (3+h)^2 = 4 + 9 + 3h - (9 + 6h + h^2)$
$= 4 + 9 + 3h - 9 - 6h - h^2 = 4 - 3h - h^2$
diff quotient $= \dfrac{(4 - 3h - h^2) - f(3)}{h} = \dfrac{(4 - 3h - h^2) - (4 + 9 - 9)}{h}$
$= \dfrac{-3h - h^2}{h} = \boxed{-3 - h}$

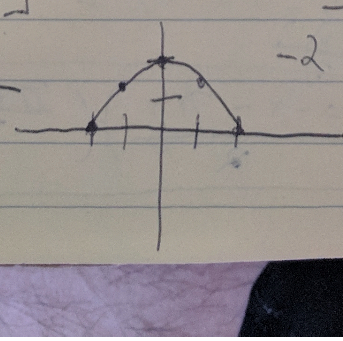
29 ~~replace x with a when needed~~
~~$\dfrac{\frac{1}{x} - \frac{1}{a}}{x - a}$~~ (on last page)

32) determine when denominator $= 0$
$x^2 + x - 6 = 0 \Rightarrow (x-2)(x+3) = 0$ $x = \{2, -3\}$
$\boxed{\{x \mid x \neq 2, x \neq -3\}}$

33) ~~$(2t-1)^{\frac{1}{3}}$ find domain so... $2t - 1 \geq 0$~~ (on last page)
~~$2t \geq 1$~~
~~$\{t \mid t \geq \frac{1}{2}\}$~~ ~~$t \geq \frac{1}{2}$~~

38) $h(x) = \sqrt{4 - x^2}$ domain: $4 - x^2 \geq 0$
domain: $[-2, 2]$ $4 \geq x^2$
range: $[0, 2]$ $\pm 2 \geq x$ ← this isn't right?
$-2 \leq x \leq 2$

x	h(x)
-2	0
-1	$\sqrt{3}$
0	2
1	$\sqrt{3}$
2	0



(graph on last page)

40) $\cancel{g(t) = \frac{t^2-1}{t+1}}$ domain: $\{x \mid x \neq -1\}$

range: $(-\infty, -2) \cup (-2, \infty)$

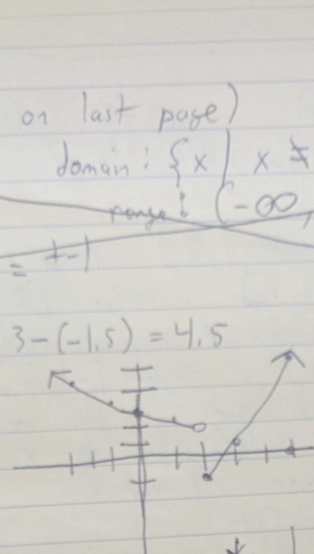
$\cancel{= \frac{(t+1)(t-1)}{t+1} = t-1}$

42)

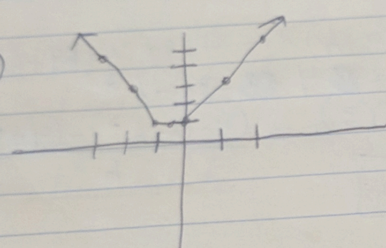
$f(-3) = 3 - \frac{1}{2}(-3) = 3 - (-1.5) = 4.5$

$f(0) = 3$

$f(2) = 2 - 1$



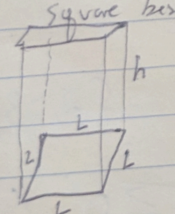
48)



t	$h(t)$
-3	5
-2	3
-1	1
0	1
1	3
2	5

61) open rect box volume $= 2\,m^3$

square base



surface area $= L^2 + 4Lh$ (only one base)

$L^2 h = 2m^3$

$h = \frac{2m^3}{L^2}$

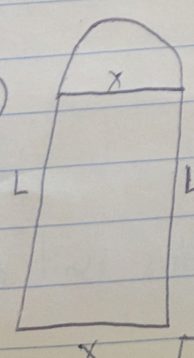
replace:

surface area $= L^2 + 4L\frac{2m^3}{L^2}$

$= L^2 + \frac{8Lm^3}{L^2}$

$\boxed{= L^2 + 8m^3}$

62)



perimeter $= 30$

$30 = x + 2L + \pi r$

$= x + 2L + \pi x$

$2L = 30 - x - \pi x \Rightarrow L = \frac{30 - x - \pi x}{2}$

area $= xL\,\frac{\pi x^2}{2}$

$\boxed{\text{area} = x\left(\frac{30 - x - \pi x}{2}\right)\left(\frac{\pi x^2}{2}\right)}$

78) $f(x) = 1 + 3x^3 - x^5$ $\qquad f(2) = -7$

$f(-x) = 1 + 3(-x)^3 - (-x)^5$

$= 1 - 3x^3 + x^5$ $\qquad f(2) = 9$

$\boxed{\text{neither}}$ $\qquad$ so $f(-x) \neq -f(x)$ or $f(x)$

$\boxed{1.2}$ 2) a) $y = \pi^x$ exponential function

b) $y = x^\pi$ power function

c) algebraic function or polynomial of 5th degree

d) trigonometric function

e) rational function

f) algebraic function

4) a) G has linear slope of 3

b) $y = 3^x$; f $\quad$ power function, as $x \to -\infty$, y approaches 0

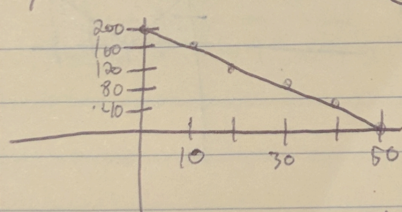
c) $y = x^3$; F $\quad$ as $x \to \infty, y \to \infty$, as $x \to -\infty, y \to -\infty$

when $x = 0, y = 0$

d) g inverse of F so graphically it's reflected over $y = x$

$y = \sqrt[3]{x}$ is the inverse of $y = x^3$

14) $y = 200 - 4x$ when $x = [0, 50]$

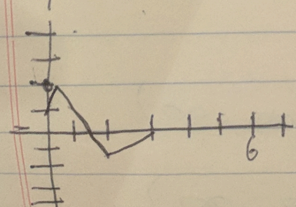


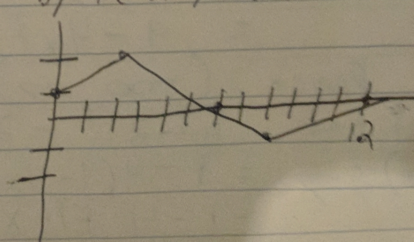
b) the slope is the rate of change with respect to x. Here, for every Δx, y decreases by 4.

the y intercept is the y coordinate when $x = 0$. It's where the equation intercepts the y-axis

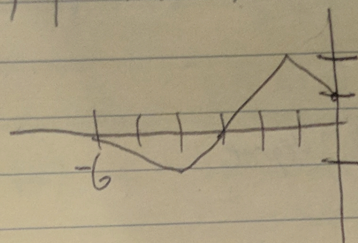
the x intercept is the x coordinate when $y = 0$. It's where the equation intercepts the x-axis.

$\boxed{1.3}$ 5) a) $y = f(2x)$ (compressed horizontally) $\qquad$ b) $f(\frac{1}{2}x)$ (stretched horiz)

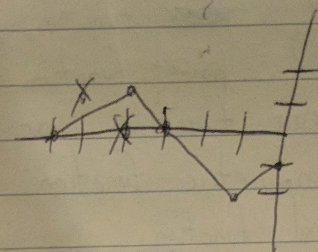




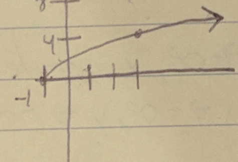
c) $y = f(-x)$ (reflect over y)



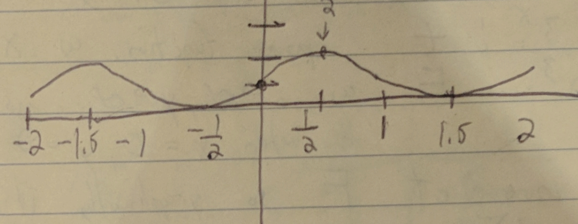
d) $y = -f(-x)$



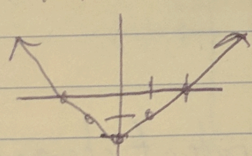
14) $y = 2\sqrt{x+1}$



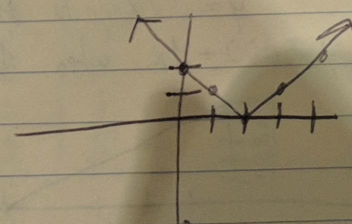
16) $y = 1 + \sin \pi x$



20) $y = |x| - 2$



21) $y = |x-2|$



34) a) $f \circ g$ $\quad (1-4x)^3 - 2$

$= (1 - 8x + 16x^2)(1-4x) - 2$

$= 1 - 8x + 16x^2 - (4x + 32x^2 - 64x^3) - 2$

$= 64x^3 - 16x^2 - 4x - 1$

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

b) $g \circ f$ $\quad 1 - 4(x^3 - 2)$

$= 1 - (4x^3 - 8)$

$= 9 - 4x^3$

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

c) $f \circ f$ $\quad (x^3 - 2)^3 - 2$ $\quad$ Domain : $(-\infty, \infty)$

d) $g \circ g$ $= 1 - 4(1-4x)$

$= 1 - 4 + 16x$ $\quad$ Domain : $(-\infty, \infty)$

52) a) 5 $\quad$ b) 2 $\quad$ c) 4 $\quad$ d) 3 $\quad$ e) 1 $\quad$ f) 4

4) $x-1 \geq 5$ $\quad x-1 \leq -5$ $\quad x-3 \geq 5$ $\quad x-3 \leq -5$

$x \geq 6$ $\quad x \leq -4$ $\quad x \geq 8$ $\quad x \leq -2$

Lets split it up into segments!

a) Say $(x-1) \geq 0$ and $(x-3) \geq 0$ so $x \geq 1$ and $x > 3$

So $x \geq 3$ so $|x-1| - |x-3| = (x-1)-(x-3) = -1+3 = 2 \geq 5$

impossible

b) Say $(x-1) < 0$ and $x \geq 0$ so $x \leq 1$ and $x \geq 3$

impossible

c) $1 \leq x < 3$ so $|x-1| - |x-3| = (x-1)-(3-x) =$

$2x-4 \geq 5$ so $2x \geq 9$

impossible since $1 \leq x < 3$ and $x \geq 4.5$ $\quad x \geq 4.5$

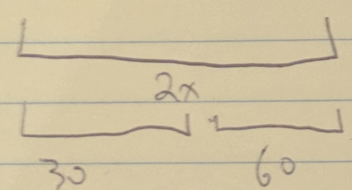
d) $x \leq 3$ $\quad x < 1$

So $|x-1| - |x-3| = (1-x)-(3-x) = -2 \geq 5$

impossible

No solution

15)



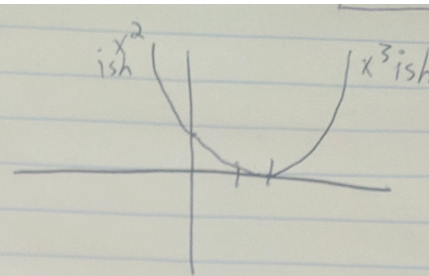
$2x = 60$

total time = 1 h + 0.5 hr

$\frac{60}{1.5} = \frac{40}{1}$ $\quad \boxed{40 \text{ mph}}$

$$6c = 4$$
$$c = \frac{2}{3}$$

It'd look something like this:
if $c = \frac{2}{3}$



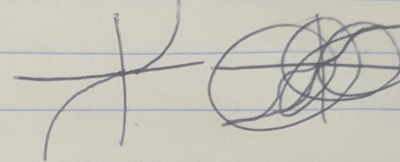
Corrections for module 1

29 33 40

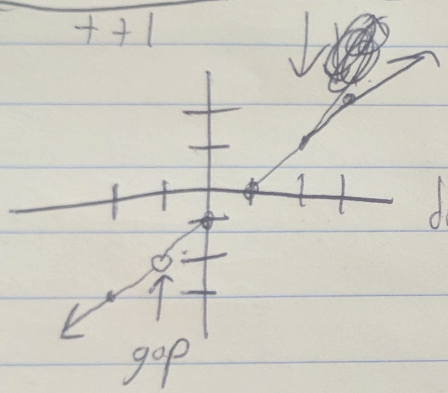
29) $$\frac{\frac{1}{x} - \frac{1}{a}}{x-a} = \frac{\frac{a-x}{ax}}{x-a} = \frac{\cancel{a-x}}{ax} \cdot \frac{1}{\cancel{x-a}} = \boxed{\frac{-1}{ax}}$$

is this the right way to simplify? Why is $\frac{\frac{1}{x}-\frac{1}{a}}{x-a}$ unsimplified

33) domain: $(-\infty, \infty)$ right? cubed roots look like:



40) $$\frac{(t+1)(t-1)}{t+1} = \boxed{t-1}$$



domain: $\{t \mid t \neq -1\}$

domain interval notation: $(-\infty, -1) \cup (-1, \infty)$

range: $(-\infty, -2) \cup (-2, \infty)$