A∞Ω
MATH@TD

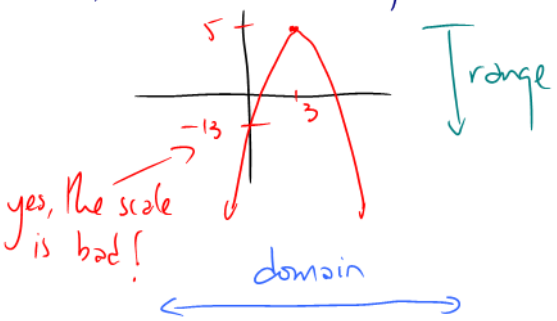
MCR3U Exam Review

Solutions

Chapter 1 – Introduction to Functions

1. Determine the domain and range of each function:
   a. $f(x) = -2(x-3)^2 + 5$ vertex: (3, 5) - opens down
   b. $g(x) = \sqrt{x+3}$

a) Sketch (rough)

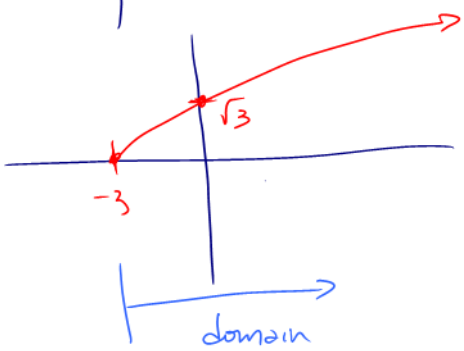


$D_f = \{x \in \mathbb{R}\}$

$R_f = \{f(x) \in \mathbb{R} \mid f(x) \leq 5\}$

b) $g(x) = \sqrt{x+3}$

rough sketch



range

$D_g = \{x \in \mathbb{R} \mid x \geq -3\}$

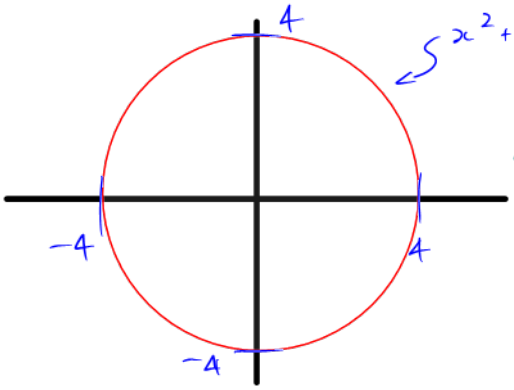
$R_g = \{g(x) \in \mathbb{R} \mid g(x) \geq 0\}$

2. For the two functions in #1 determine: a) $f(0)$ b) $g(9)$

$f(0) = -2(0-3)^2 + 5$
$= -2(9) + 5$
$= -13$

$g(9) = \sqrt{9+3}$
$= \sqrt{12} = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3}$
$= 2\sqrt{3}$

3. On a set of axes sketch a relation which is not a function. Explain why your sketch does not represent a function.



$x^2+y^2=16$

dependent variable is raised to an even power

This relation fails the Vertical Line Test and so is not a fn.

4. Given the function state the parent function and all transformations which would turn the parent function into the given (transformed) function: $f(x)=-2\sqrt{3x-6}+1$. On the same set of axes sketch the parent function and the transformed function.

$f(x) = -2\sqrt{3(x-2)} + 1$ parent fn: $g(x)=\sqrt{x}$

Transformations:

Vertical	Horizontal
Flip	Stretch $\times \frac{1}{3}$
Stretch $\times 2$	Shift right 2
Shift up 1	

Tables of Values

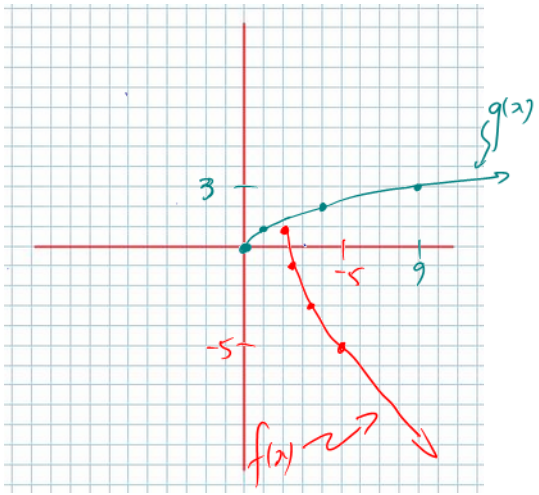
Parent

x	$g(x)$
0	0
1	1
4	2
9	3

Transformed

$\frac{1}{3}x+2$	$-2g+1$
2	1
$\frac{7}{3}$	-1
$\frac{10}{3}$	-3
5	-5

Sketches



Chapter 2 – Rational Expressions

1. Factor the following:

a. x^2+5x+6

x	+
6	5

$\Rightarrow 3, 2$

$=(x+3)(x+2)$

b. $16x^4-81$ square minus square $\Rightarrow$ difference of squares

another diff of squares

$=(4x^2-9)(4x^2+9)$

$=(2x-3)(2x+3)(4x^2+9)$

next pg.

c. $4p^2 - 12pq + 9q^2$

root $2p$, $2(2p)(3q)$, root $3q$ — perfect square

$= (2p - 3q)^2$

or use $\begin{array}{c|c} \times & + \\ \hline +36 & -12 \end{array}$ $\Rightarrow -6, -6$ — decomposition works too.

2. Have a snack so delicious that it's ridiculous.

Life makes more sense now

3. Simplify. Be sure to state all restrictions on the variable.

a. $\dfrac{x^2 + 2x - 8}{(x+4)(x+1)}$ $\begin{array}{c|c} \times & + \\ \hline -8 & 2 \end{array}$ $4, -2$ rest: $x \neq -4, -1$

Always remember FACTORED FORM IS YOUR FRIEND

$= \dfrac{(x+4)(x-2)}{(x+4)(x+1)}$

$= \dfrac{x-2}{x+1}$

b. $\dfrac{2x-1}{x^2-x-6} \times \dfrac{2x^2+5x+2}{4x^2-1}$

$= \dfrac{2x-1}{(x-3)(x+2)} \times \dfrac{(2x+1)(x+2)}{(2x-1)(2x+1)}$ restrictions: $x \neq 3, -2, \frac{1}{2}, -\frac{1}{2}$

$= \dfrac{1}{x-3}$

c. $\dfrac{x^2-25}{x^2-10x+25} \div \dfrac{2x^2+9x-5}{3x^2-13x-10}$

$\begin{array}{c|c} \times & + \\ \hline -30 & -13 \end{array}$ $-15, +2$

$3x^2 - 15x + 2x - 10$
$= 3x(x-5) + 2(x-5)$
$= (x-5)(3x+2)$

} factoring review.

$= \dfrac{(x-5)(x+5)}{(x-5)^2} \div \dfrac{(2x-1)(x+5)}{(3x+2)(x-5)}$ restrictions: $x \neq 5, -\frac{2}{3}, \frac{1}{2}, -5$

$= \dfrac{(x-5)(x+5)}{(x-5)^2} \times \dfrac{(3x+2)(x-5)}{(2x-1)(x+5)} = \dfrac{3x+2}{2x-1}$

d. $\dfrac{3x}{4x^2-9} - \dfrac{4x}{6x^2+13x+6}$ (be careful with your signs when simplifying!)

restrictions: $x \neq 3/2, -3/2, -2/3$

common denom: $(2x-3)(2x+3)(3x+2)$

$$= \frac{3x}{(2x-3)(2x+3)} - \frac{4x}{(3x+2)(2x+3)}$$

$$= \frac{3x(3x+2) - 4x(2x-3)}{(2x-3)(2x+3)(3x+2)}$$

← collect like terms

← factored form is your friend.

$$= \frac{9x^2 + 6x - 8x^2 + 12x}{(2x-3)(2x+3)(3x-2)}$$

$$= \frac{x^2 + 18x}{(2x-3)(2x+3)(3x-2)}$$

← could factor to $x(x+18)$, but no need here

Chapter 3 – Quadratics

1. Given $f(x) = -5x^2 + 20x + 1$

   a. Determine the equation of the AoS

3 methods → find zeros; → partial factoring; → complete the square

partial factoring: $f(x) = -5x(x-4) + 1$

set to zero ⇒ consider $x = 0, 4$

$$\text{AoS}: x = \frac{0+4}{2}$$

$$\Rightarrow x = 2$$

   b. The max/min value. Which is it, a max or a min, and why?

The max value is the $f(x)$ value of vertex

We have a max since the parabola opens down

recall: Vertex $= (\text{AoS}, f(\text{AoS}))$

$f(2) = -5(2)^2 + 20(2) + 1 = 21$ ∴ The max value is 21

c. How many zeros does the function have (there are at least two acceptable answers here)

① Since $f(x)$ has a positive max $\Rightarrow$ 2 zeros

② $b^2 - 4ac = (20)^2 - 4(-5)(1)$

$= 420 > 0 \Rightarrow$ 2 zeros

d. Determine the zeros using any method of your choice.

quadratic formula: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \dfrac{-20 \pm \sqrt{420}}{2(-5)}$

$\therefore x = \dfrac{-20 + \sqrt{420}}{-10}$ or $x = \dfrac{-20 - \sqrt{420}}{-10}$

$= -0.049$ $= 4.049$

e. Express the function in vertex form. State the domain and range of the quadratic.

$f(x) = a(x-h)^2 + k$ $a = -5$, vertex $= (2, 21)$

$f(x) = -5(x-2)^2 + 21$

$D_f: \{x \in \mathbb{R}\}$

$R_f: \{f(x) \in \mathbb{R} \mid f(x) \leq 21\}$ (max/biggest value)

2. Simplify:

a. $3\sqrt{12} - 6\sqrt{75}$

$= 3\sqrt{4\times3} - 6\sqrt{25\times3}$

$= 6\sqrt{3} - 30\sqrt{3}$

$= 24\sqrt{3}$

b. $\sqrt{3}\left(2\sqrt{5} + 5\sqrt{2}\right) + \sqrt{24}$

$= 2\sqrt{15} + 5\sqrt{6} + \sqrt{4\times6}$

$= 2\sqrt{15} + 5\sqrt{6} + 2\sqrt{6}$

$= 2\sqrt{15} + 7\sqrt{6}$

c. $\left(2 + \sqrt{5}\right)\left(1 - \sqrt{10}\right)$

$= 2 - 2\sqrt{10} + \sqrt{5} - \sqrt{50}$

$= 2 - 2\sqrt{10} + \sqrt{5} - \sqrt{25\times2}$

$= 2 - 2\sqrt{10} + \sqrt{5} - 5\sqrt{2}$

3. Determine the equation, in zeros form, of a quadratic function which has the following characteristics:

a. $y_{int} = -2$ ⇒ point $(0, -2)$

b. The quadratic has two zeros: $x = -1$ (s), $x = 3$ (r)

zeros form $g(x) = a(x-s)(x-r)$ — probably need to calculate

$g(x) = a(x+1)(x-3)$ use $(0, -2)$ to find a

$(x, g(x))$

$-2 = a(0+1)(0-3)$

$-2 = -3a \Rightarrow a = \frac{2}{3}$

$\therefore g(x) = \frac{2}{3}(x+1)(x-3)$

4. Smile – you're doing math!

Amen, and amen.

5. Sketch the graph of the function $f(x) = x^2 + 2x - 3$. Label the vertex, the zeros, the y-intercept and the AoS.

factored form: $f(x) = (x+3)(x-1)$

⇒ zeros: $x = -3, 1$

⇒ AoS: $x = \frac{-3+1}{2} = -1$

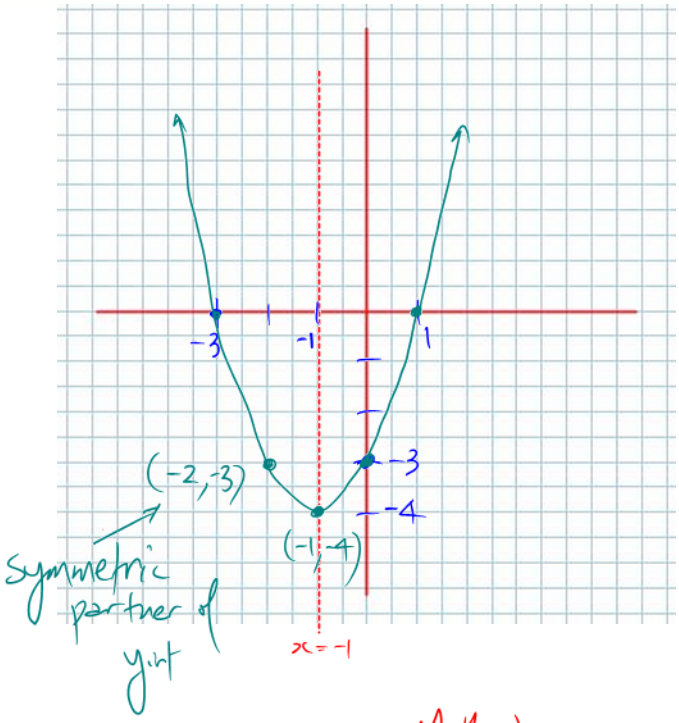
vertex: $(AoS, f(AoS))$

$= (-1, f(-1))$

$= (-1, -4)$

$y_{int}: (0, f(0))$

$= (0, -3)$



6. Solve the equations:

a. $2x^2 - 3x = 5$ Standard form! $ax^2 + bx + c = 0$

$\Rightarrow 2x^2 - 3x - 5 = 0$

x	+
-10	-3

$-5, +2$ ✓

$\Rightarrow (2x-5)(x+1) = 0$

$\therefore x = 5/2$ or $x = -1$

Methods
① Factor
② Quadratic formula
③ Graphing Tech (but not on the exam)

b. $3x^2+x-1=5x+1$

$\Rightarrow 3x^2-4x-2=0$ (does not factor)

$a=3 \quad b=-4 \quad c=-2$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{4\pm\sqrt{(-4)^2-4(3)(-2)}}{2(3)}$$

$$\therefore x=\frac{4\pm\sqrt{40}}{6} \Rightarrow x=\frac{4+\sqrt{40}}{6} \text{ or } x=\frac{4-\sqrt{40}}{6}$$

$$=1.72 \qquad =-0.39$$

7. What is the discriminant, and what does it do, and how does it do what it does?

The discriminant is the radicand part of the quadratic formula.

ie. The discriminant $D=b^2-4ac$

If i) $b^2-4ac>0 \Rightarrow$ The quadratic has 2 zeros

ii) $b^2-4ac=0 \Rightarrow$ " " " 1 zero

iii) $b^2-4ac<0 \Rightarrow$ " " " 0 zeros

8. The height, $h(t)$, in meters, of the trajectory of a baseball is given by $h(t)=1.4+22.4t-4.9t^2$. Determine the maximum height of the baseball and the time when that height is achieved.

↳ need the vertex!

$h(t)=-4.9t^2+22.4t+1.4$ using QF. to find the zeros which allows us to find the AoS, which allows us to find the vertex.

QF gives: $t=-0.06$ OR $t=4.63$

AoS: $x=\frac{4.63+(-0.06)}{2}$

$=2.3 \Rightarrow$ vertex is $(2.3, h(2.3))=(2.3, 27)$

∴ The max height is 27 m at 2.3 seconds

Chapter 4 – Exponential Functions

1. Evaluate. Express as a fraction and rounded to two decimal places: $\left(-\frac{8}{27}\right)^{-\frac{4}{3}}$.

$= \left(\frac{-27}{8}\right)^{+4/3} = \frac{(-27)^{4/3}}{8^{4/3}} = \frac{\left((-27)^{1/3}\right)^4}{\left(8^{1/3}\right)^4} = \frac{(-3)^4}{2^4} = \frac{81}{16} = 5.06$

2. Simplify, using only positive exponents in your answer:

a. $\left(-2x^2y^{-1}\right)^3\left(3xy^2\right)^2$

$= (-8x^6y^{-3})(9x^2y^4)$

$= -72x^8y^1$

b. $\sqrt[4]{\frac{32x^{-2}}{(2x)^{-3}}}$

$= \left((32x^{-2})(2x)^3\right)^{1/4}$

$= \left((32x^{-2})(8x^3)\right)^{1/4}$

$= (256x)^{1/4}$

$= 4x^{1/4}$

c. $\frac{\left(3p^2q^{-3}\right)^{-2}}{9p^{-6}q^{10}}$

$= \frac{3^{-2}p^{-4}q^{6}}{9p^{-6}q^{10}} \rightarrow = \frac{p^2}{81q^4}$

3. A small city had a population of 106,000 in the year 2001. If the city was experiencing an average annual growth rate of 1.33% determine the population of the city in the year 2011.

$P(t) = P_0(1+r)^t$, $r = 0.0133$, 2001 represents $t=0$

$\Rightarrow$ 2011 represents $t=10$

$P_0 = 106000$

$P(15) = 106000(1.0133)^{10}$

$= 120\,972$ people.

4. As hard as it may be to believe, God loves you.

Amen

5. How are exponential functions similar to the formulas of financial mathematics?

The general growth formula $P(t) = P_0(1+r)^t$ is equivalent to the F.V. formula for compound interest $A = P(1+i)^n$

6. At 2:30pm a colony of 50 million viruses make a home in your body. (Thanks to the student who sneezed on you earlier in the day. Ew.) The doubling period of the virus is 3.5 hours. What is the population of the bacteria colony when you wake up the next day at 6am?

Given	Want
$P_0 = 50$ mill.	$P(15.5)$
$D = 3.5$	
$t = 15.5$	

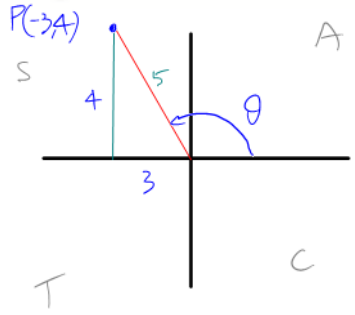
2^{30} pm to 6am

$$P(t) = P_0\left(2\right)^{t/D}$$
$$= 50\left(2\right)^{\frac{15.5}{3.5}}$$
$$= 1076.72 \text{ million}$$

$\Rightarrow$ There are 1,076,720,000 virii in your body - 1 billion - that's a lot!

Chapter 5 – Trigonometric Ratios

1. The terminal arm of some angle of rotation, θ, ends at the point $P(-3,4)$. Sketch the angle of rotation and determine the six trigonometric ratios for θ.



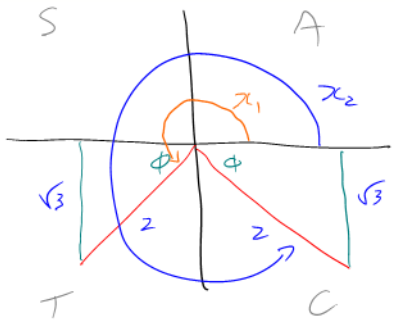
$\sin(\theta) = \frac{4}{5}$ $\quad \csc(\theta) = \frac{5}{4}$

$\cos(\theta) = -\frac{3}{5}$ $\quad \sec(\theta) = -\frac{5}{3}$

$\tan(\theta) = -\frac{4}{3}$ $\quad \cot(\theta) = -\frac{3}{4}$

2. Determine angle(s) x, where $0° \le x \le 360°$, for:

a. $\sin(x) = -\frac{\sqrt{3}}{2}$

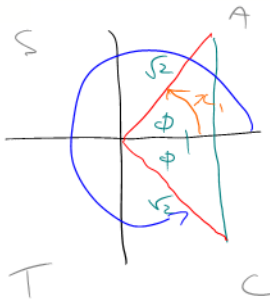


$\Phi = 60°$

$x_1 = 180° + 60°$
$= 240°$

$x_2 = 360 - 60$
$= 300°$

b. $\sec(x) = \sqrt{2}$ $\Rightarrow \cos(x) = \frac{1}{\sqrt{2}}$

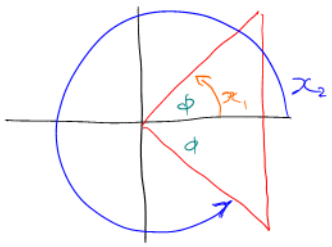


$\Phi = 45°$

$x_1 = 45°$

$x_2 = 360 - 45$
$= 315°$

c. $\cos(x) = 0.1253$



$\phi = \cos^{-1}(0.1253)$

$= 82.8°$

$x_1 = 82.8°$

$x_2 = 360 - 82.8$

$= 277.2°.$

3. Prove: a) $1+\cot^2(\alpha) = \csc^2(\alpha)$ b) $\csc(\theta)\sec(\theta) = \cot(\theta)+\tan(\theta)$

a) RHS $= 1 + \cot^2(\alpha)$

$= 1 + \dfrac{\cos^2(\alpha)}{\sin^2\alpha}$

$= \dfrac{\sin^2\alpha}{\sin^2\alpha} + \dfrac{\cos^2\alpha}{\sin^2\alpha}$

$= \dfrac{\sin^2\alpha + \cos^2\alpha}{\sin^2\alpha}$

$= \dfrac{1}{\sin^2\alpha} = \csc^2\alpha = RHS$ □

b) RHS $= \cot(\theta) + \tan(\theta)$

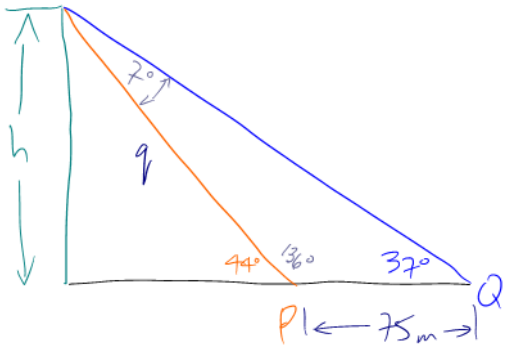
$= \dfrac{\cos(\theta)}{\sin(\theta)} + \dfrac{\sin(\theta)}{\cos(\theta)}$

$= \dfrac{\cos^2(\theta) + \sin^2(\theta)}{\sin(\theta)\cos(\theta)}$

$= \dfrac{1}{\sin(\theta)\cdot\cos(\theta)}$

$= \csc(\theta)\cdot\sec(\theta) = LHS$ □

4. A building of height h is observed from two points, P and Q, which are $75m$ apart. The angle of elevation from point Q is $37°$, and $44°$ from point P. Draw a picture representing the situation and determine the height, h, of the building.



$\dfrac{q}{\sin(37)} = \dfrac{75}{\sin(7)}$

$\Rightarrow q = \dfrac{75(\sin(37))}{\sin(7)} = 370.37$

$\sin(44) = \dfrac{h}{q}$

$\Rightarrow h = q\cdot\sin(44)$

$= (370.37)(\sin(44)) = 257.3\ m$

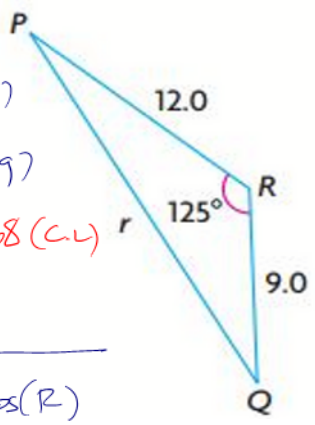
∴ The height of the building is 257.3 m.

5. Stop and smell the flowers. And look at the sky.

I feel better now.

6. Solve the triangles:

a.



$P = 23.2°$ (AST) $p = 9$ (g)

$Q = 31.8°$ (SL) $q = 12$ (g)

$R = 125°$ (g) $r = 18.68$ (CL)

$r = \sqrt{p^2 + q^2 - 2pq\cos(R)}$

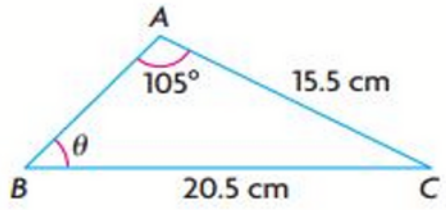
$= 18.68$

$\frac{\sin(Q)}{12} = \frac{\sin(125)}{18.68}$

$\Rightarrow Q = \sin^{-1}\left(\frac{12 \cdot \sin(125)}{18.68}\right)$

$= 31.8°$

b.



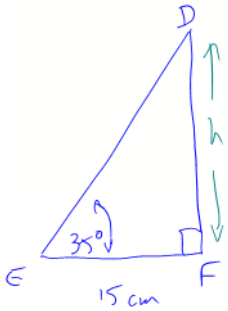
$A = 105°$ (g) $a = 20.5$ (g)

$B = 47°$ (SL) $b = 15.5$ (g)

$C = 28°$ (AST) $c = 10.1$ (SL – not shown)

$B = \sin^{-1}\left(\frac{15.5 \cdot \sin(105)}{20.5}\right) = 47°$

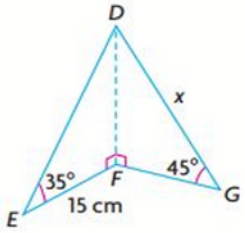
7. Determine the value of x, to the nearest hundredth. in the diagram to the right:

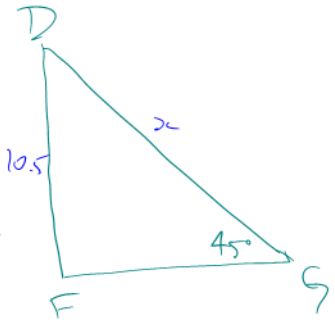


$\tan(35) = \frac{h}{15}$

$\Rightarrow h = 15 \cdot \tan(35)$

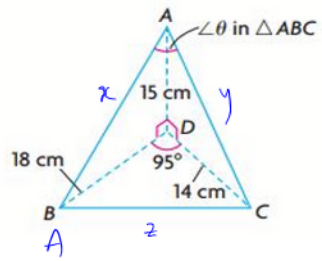
$= 10.5$ cm





$\sin(45) = \frac{10.5}{x}$

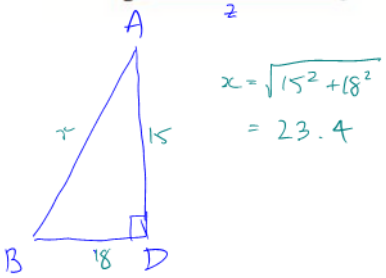
$\Rightarrow x = \frac{10.5}{\sin(45)} = 14.8$ cm



8. Determine the value of θ, to the nearest degree, in the diagram to the left:

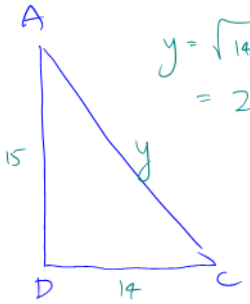
$z = \sqrt{18^2 + 14^2 - 2(18)(14)\cos(95)}$

$= 23.7$



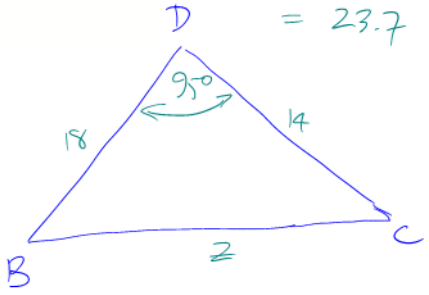
$x = \sqrt{15^2 + 18^2}$

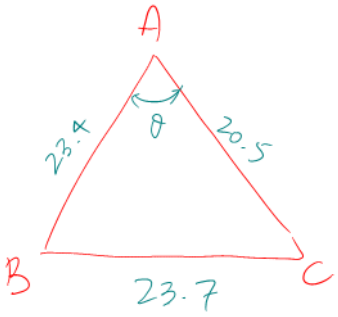
$= 23.4$



$y = \sqrt{14^2 + 15^2}$

$= 20.5$





$\cos(\theta) = \dfrac{(23.4)^2 + (20.5)^2 - (23.7)^2}{2(23.4)(20.5)}$ (Cos Law for angles)

$\Rightarrow \theta = \cos^{-1}(\quad " \quad) = 25^\circ$

Chapter 6 – Sinusoidal Functions

1. Sketch two cycles of the function $f(\theta) = 3\sin(2\theta - 120^\circ) + 1$. Also, state:

   a. The range of $f(\theta)$

   b. The period of the function

   c. The phase shift

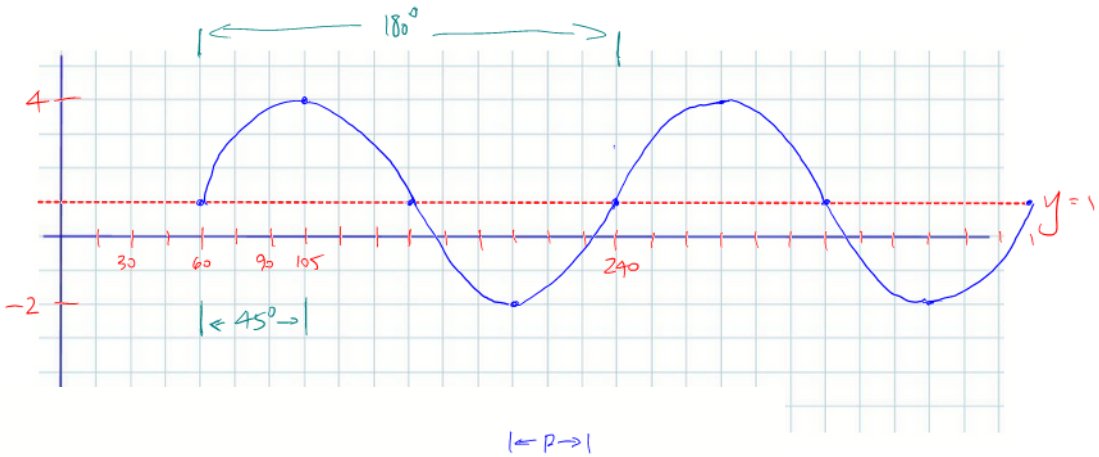
$f(\theta) = 3\sin(2(\theta - 60^\circ)) + 1$

amplitude: 3

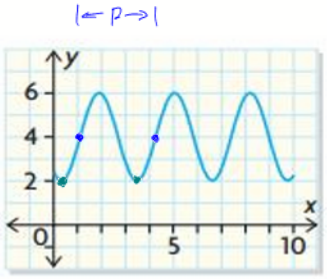
Period: $\frac{360}{2} = 180^\circ$ $\quad d\theta = \frac{180}{4} = 45^\circ$

Phase shift = 60° right → scale 15°

Central Axis: $y = 1$



2. Determine two equations, one a Sine and the other a Cosine, which describe the sketch:



Period = 3.2 (eyballing)

$k = \frac{360}{P} = 112.5$

SINE

Phase Shift 1 right

Central Axis: $y = 4$

amplitude: 2

Cosine (negative cosine!)

P.S.: 0.3 right

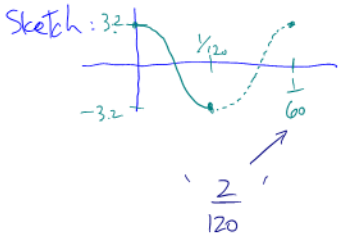
Sine: $g(x) = 2\sin(112.5(x-1)) + 4$

Cosine: $f(x) = -2\cos(112.5(x-0.3)) + 4$

3. It's not good to sit for too long. It's time for the 6th Chapter stretch. Stand up sit down, stand up sit down, stand up sit down, stand up sit down. Were you a cosine or a sine?

"Negative" cosine since I began at the min.

4. An oscilloscope is measuring the current (in *Amps*) from an AC source (Alternating Current). At $t = 0$ the oscilloscope records a max current of $3.2A$. At $t = \frac{1}{120}$ seconds the oscilloscope records the first minimum current of $-3.2A$. Determine an equation of a function which will describe the current in terms of time.



amplitude: 3.2

Period: $\frac{1}{60}$

$\Rightarrow k = \frac{360}{p} = \frac{360}{\frac{1}{60}} = 21{,}600$

P.S. = 0

C.A. $y = 0$

$$f(t) = 3.2\cos(21600t)$$

Chapter 7 – Sequences and Series

1. The first term of an arithmetic sequence is 7. If $t_{10} = -24.5$, determine:

   a. The general term for the sequence, t_n

$t_{10} = a + 9d$

$-24.5 = 7 + 9d \Rightarrow d = -3.5$

$t_n = 7 + (n-1)(-3.5)$

$\Rightarrow t_n = 10.5 - 3.5n$

   b. t_{25}.

$t_{25} = 10.5 - 3.5(25)$

$= -77$

   c. S_{25}

Two formulas

$S_n = \frac{n(2a + (n-1)d)}{2}$

$\Rightarrow S_{25} = \frac{25(2(7) + 24(-3.5))}{2}$

$= -875$

$S_n = \frac{n(t_1 + t_n)}{2}$

$\Rightarrow S_{25} = \frac{25(7 - 77)}{2}$

$= -875$

2. Determine the recursive formula and the general term, t_n, for the geometric sequence:

   0.8, 2.4, 7.2,...

$r = \frac{t_2}{t_1} = \frac{2.4}{0.8} = 3$

recursive: $t_1 = 0.8$; $t_n = 3 \times t_{n-1}$

general $t_n = ar^{n-1}$

$= 0.8(3^{n-1})$

   a. Determine t_9

$t_9 = 0.8(3^8)$

$= 5248.8$

   b. Help someone. Helping others is good.

I hope these solutions help you!

   c. Determine S_{11} $S_n = \frac{a(r^n - 1)}{r - 1}$

$S_{11} = \frac{0.8(3^{11} - 1)}{3 - 1}$

$= 70\,858.4$

Chapter 8 – Financial Mathematics

1. One day you're ambling alongside a sunny river when you suddenly trip over a paper sack. Inside the sack you find two things: a lollipop stick with the remnants of a grape lolli, and $67 500. Being a good citizen you take the sack of money to the nearest police station. Along the way you make certain that the lollipop stick finds its way into a trash bin. After filling out the paperwork for the found money you go home and wait. 30 days. It's a lot of waiting, but you fill the time in the best way possible. You do some math. Finally the 30 days are up and the money, never being claimed, is yours. You take the money straight to the bank. You do not pass go. You do not collect $200 (no need to be greedy!). You deposit the $67 500 in an account paying 1.2%/a compounded quarterly. How much money will be in the account after 7.5 years?

Given	Want
$P = 67\,500$	A
$i = \frac{0.012}{4} = 0.003$	
$n = (12)(7.5) = 90$	

$$A = 67{,}500\,(1.003)^{90} = \$88\,386.87$$

2. Miriam borrows $14 500 to buy a car. The finance company charges 2.4%/a compounded monthly. If Miriam plans to pay the loan off in 4 years, how much will she have to pay the finance company every month?

Given	Want
$P.V. = 14\,500$	R
$i = \frac{0.024}{12} = 0.002$	
$n = (12)(4) = 48$	

$$P.V. = \frac{R\left(1-(1+i)^{-n}\right)}{i}$$

$$\Rightarrow R = \frac{(14500)(0.002)}{\left[1-(1.002)^{-48}\right]} = \$317.12$$

3. At the age of 25 you open a savings account which pays 0.8%/a compounded monthly. Every month, faithfully, you manage to deposit $1500 for 40 years. What is the value of the account when you are 65? How much interest did you earn?

Given	Want
$R = 1500$	$F.V.$
$i = \frac{0.008}{12}$	
$n = (12)(40) = 480$	

$$F.V. = \frac{R\left((1+i)^{n}-1\right)}{i}$$

$$= \frac{1500\left[\left(1+\frac{0.008}{12}\right)^{480}-1\right]}{\frac{0.008}{12}}$$

$$= \$848{,}207.12$$

Interest

$= F.V. - \text{money deposited}$

$= 848207.12 - (1500)(480)$

$= \$128{,}207.12$

FREE MONEY!

Blessings upon your exams!