Unit 1

Multiple Choice

1. B	5. A	9. B or D
2. A	6. A	10. A
3. A	7. B	11. A
4. C	8. C	

12. Mapping Rule

a. $(x,y) \rightarrow (\frac{1}{4}x+1, -2y+3)$ (4, 13)

b. $(x,y) \rightarrow (-x-7, 4y)$ (-19, -20)

c. $(x,y) \rightarrow (x-6, \frac{2}{5}y-8)$ (6, -10)

d. $(x,y) \rightarrow (\frac{1}{2}x-5, -y-3)$ (1, 2)

e. $(x,y) \rightarrow (3x+2, y-6)$ (38, -11)

f. $(x,y) \rightarrow (x, 10y-8)$ (12, -58)

Image Point (12, -5)

13. $h(x) = 2f(-2(x+4)) + 13$

(a)

Domain $f(x)$ $-10 \leq x \leq -2$

Range $f(x)$ $-6 \leq y \leq -2$

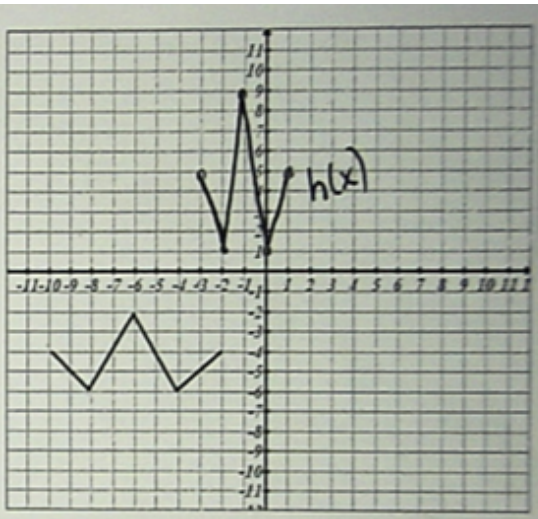
Domain $h(x)$ $-3 \leq x \leq 2$

Range $h(x)$ $1 \leq y \leq 9$

$(x,y) \rightarrow (-\frac{1}{2}x-4, 2y+13)$

x	y
-10	-4
-8	-6
-6	-2
-4	-6
-2	-4

x	y
1	5
0	1
-1	9
-2	1
-3	5



13. (b) $m(x) = -1.5f(x-8)+4$

Domain $f(x) = -9 \leq x \leq -2$

Range $f(x)$ $4 \leq y \leq 10$

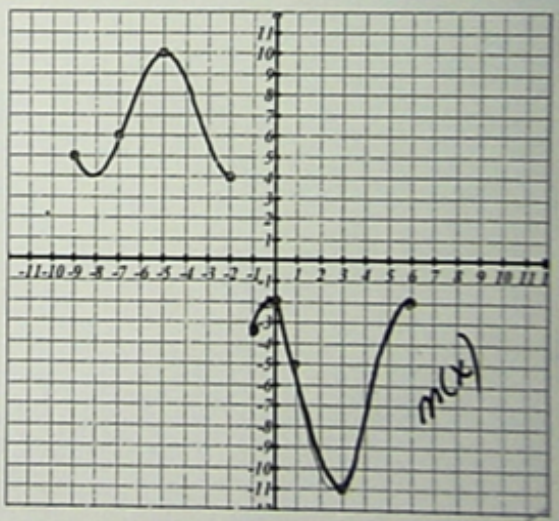
Domain $m(x)$ $-1 \leq x \leq 6$

Range $m(x)$ $-11 \leq y \leq -2$

$(x,y) \rightarrow (x+8, -1.5y+4)$

x	y
-9	5
-8	4
-7	6
-5	10
-2	4

x	y
-1	-35
0	-2
1	-5
3	-11
6	-2



14 (a) $y = 3f[-(x-5)] - 2$

(b) $y = -f[-4(x-2)]$

(c) $y = 9f[-\frac{1}{8}x] + 4$

15 Rotate, Stretch then translate

(a) $y = 3f[-2(x-4)] + 24$

(b) $y = -3f(x+7) - 6$

16. (a) $f(x) = \frac{2}{3}x + 5$

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

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

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

$2(x-5) = 2y$

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

(b) $f(x) = \sqrt{3x-12} - 20$

$y = \sqrt{3x-12} - 20$

Inv: $x = \sqrt{3y-12} - 20$

$x + 20 = \sqrt{3y-12}$

$(x+20)^2 = 3y - 12$

$(x+20)^2 + 12 = 3y$

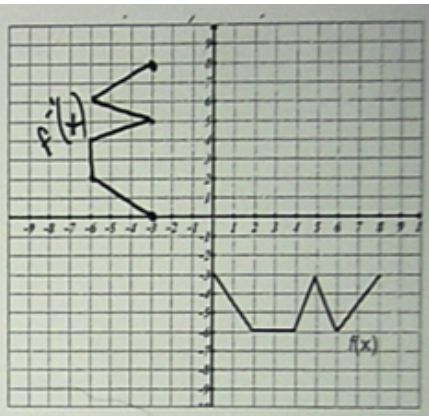
$\frac{(x+20)^2 + 12}{3} = y$

17. Domain $f(x)$ $0 \le x \le 8$

Range $f(x)$ $-6 \le y \le -3$

Domain $f^{-1}(x)$ $-6 \le x \le -3$

Range $f^{-1}(x)$ $0 \le y \le 8$



18 $(8,-18)$ is on $f(x)$

$(-18,8)$ is on $f^{-1}(x)$

$(x,y) \to (\frac{1}{6}x, 2y-11)$

$(-18,8) \to (-3,5)$

Unit 1 : Chapter 10

1. $y = f(x) + g(x)$
$= (x^2 - 3x) + (4x + 5)$
$= x^2 - 3x + 4x + 5$
$y = x^2 + x + 5$

2. $y = f(x) + g(x)$
$= (x^2 - 8) + (-2 - x^2)$
$= x^2 - 8 - 2 - x^2$
$= -10$

3. $h(x) = \frac{f(x)}{g(x)}$
$= \frac{x^3 - 81x}{x + 9}$ $x+9 \neq 0$ $x \neq -9$
$x \neq -9$
$= \frac{x(x-9)(x+9)}{(x+9)}$
$= x(x-9)$

4. $h(x) = f(g(x))$
$= (-5-x)^2 - 8$
$= 25 + 10x + x^2 - 8$
$= x^2 + 10x + 17$

5. $h(x) = f(x) - g(x)$
$= -\sqrt{x+2} - (x^2 - 2x + 7)$
$= -\sqrt{x+2} - x^2 + 2x - 7$
Domain $x + 2 \geq 0$
$x \geq -2$

cannot take $\sqrt{}$ of $-$ $x + 2 \geq 0$ $x \geq -2$

6. $(f \circ g)x$
$= f(g(x))$ $g(x) = \frac{1}{x-3}$ $f\left(\frac{1}{x-3}\right)$
$= \frac{1}{x-3} + 3$
$= \frac{1 + 3(x-3)}{x-3}$
$= \frac{1 + 3x - 9}{x-3}$
$= \frac{3x - 8}{x-3}$

7. $h(x) = \frac{f(x)}{g(x)}$
$= \frac{-7\sqrt{x} - 5}{\sqrt{x} + 9}$
$x \geq 0$; $\sqrt{x} + 9 \neq 0$ $\sqrt{x} \neq -9$ $x \neq 81$

8. $5g(x) - f(x)$
$= 5(2 - x) - (9x^2 + 7x)$
$10 - 5x - 9x^2 - 7x$
$= -9x^2 - 12x + 10$

9. $f(f(-1))$
$= f(-4)$
$= 11$

10. $h(x) = f(x)\,g(x)$
$= (x^2 - 7)(2 - x^3)$
$= 2x^2 - x^5 - 14 + 7x^3$
$= -x^5 + 7x^3 + 2x^2 - 14$

11. $h(x) = \frac{f(x)}{g(x)}$
$= \frac{x^2 - 4}{x^2 - 3x + 2}$
$= \frac{(x-2)(x+2)}{(x-2)(x-1)}$ $x \neq 2, 1$
$= \frac{x+2}{x-1}$

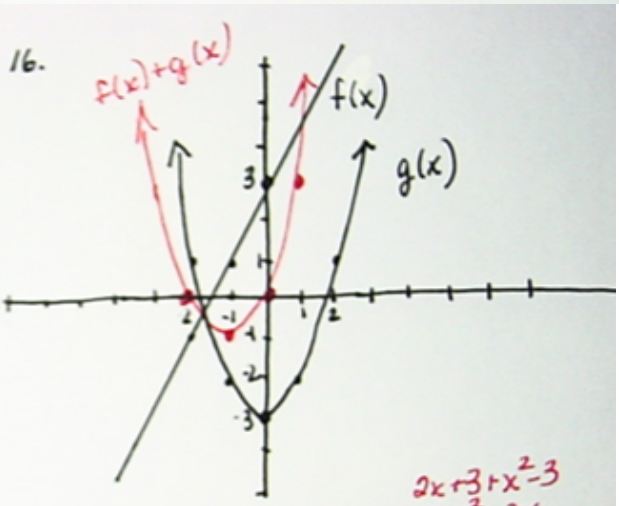
12. $f(g(2))$
$= f(-6)$
$= (-6)^2 - 7$
$= 29$

13. $g(f(\pi))$
$= \sqrt{4(\pi+3)^2} - 7$
$= 2(\pi+3) - 7$
$2\pi + 6 - 7$
$2\pi - 1$

14. $h(x) = f(g(x))$
$= f(x+1)$
$= (x+1)^2 + 3(x+1) + 2$
$= x^2 + 2x + 1 + 3x + 3 + 2$
$= x^2 + 5x + 6$

15. $f(g(x)) = g(f(x))$
$f(x^2) = g(x+2)$
$x^2 + 2 = (x+2)^2$
$x^2 + 2 = x^2 + 4x + 4$
$-2 = 4x$
$-2/4 = x$
$x = -1/2$

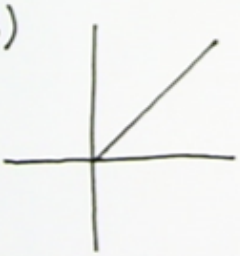
16.



$2x+3+x^2-3$
x^2+2x

x	f(x) = 2x+3	g(x) = x²−3	f(x) + g(x)
−2	−1	1	0
−1	1	−2	−1
0	3	−3	0
1	5	−2	3

17. (B)



Exponential & Logs:

Unit 2:

D)

1. C
2. D
3. C
4. B
5. D
6. A
7. B
8. B
9. B
10. D
11. D
12. A
13. A
14. C
15. D
16. C
17. B

18. (a) $\log_3 81^{68}$

$68 \log_3 81$

$68(4)$

$= 272$

(b) $\log_4 \left[\frac{25^{1/2}(24)}{30(9)} 6^2\right]$

$\log_4 16$

$= 2$

(e) $\frac{1}{5}(81+64)$

$\frac{1}{5}(145)$

29

(f) $(2+27-5+1)^{-3/2}$

$(25)^{-3/2}$

$= \frac{1}{25^{3/2}}$

$= \frac{1}{125}$

19. (a) $\dfrac{3^{5n+4} \times 3^{4(3-2n)}}{(3^3)^{n+5}}$

$\dfrac{3^{5n+4} \cdot 3^{12-8n}}{3^{3n+15}}$

$= \dfrac{3^{-3n+16}}{3^{3n+15}}$

$= 3^{-6n+1}$

(b) $\dfrac{(7x^{3q})^3}{7}$

omit

(c) $\left(\dfrac{32a^{10}b^{12}}{243a^5b^2}\right)^{3/5}$

$\dfrac{32^{3/5}a^6b^{36/5}}{243^{3/5}a^3b^{6/5}}$

$\dfrac{8a^3b^{30/5}}{27}$

$\dfrac{8}{27}a^3b^6$

3/5

19. (d) $\dfrac{-6(2a^4b^3)^3(9a^2b)}{(6a^5b)^2}$

$\dfrac{-6(8a^{12}b^9)(9a^2b)}{36a^{10}b^2}$

$\dfrac{-432a^{14}b^{10}}{36a^{10}b^2}$

$-12a^4b^8$

(e) $\dfrac{x^5 \cdot x^{2n}}{(x^2)^{n+1}}$

$\dfrac{x^{5+2n}}{x^{2n+2}}$

$x^{(5+2n)-(2n+2)}$

$x^{5+2n-2n-2}$

x^3

20. (a) $6(3)^{-2x+3} + 14 = 50$

$6(3)^{-2x+3} = 36$

$3^{-2x+3} = 6$

$-2x+3 = \log_3 6$

$-2x+3 = 1.6309$

$-2x = -1.3691$

$-x = +0.685$

(b) $(6^2)^{x^2-8} = 6^{11x-4}$

$6^{2x^2-16} = 6^{11x-4}$

$2x^2-16 = 11x-4$

$2x^2-11x-12 = 0$

$x = \dfrac{11 \pm \sqrt{217}}{4}$

quad form

(c) $81^{x+3} = 27^{\frac{1}{4}x}$

$3^{4x+12} = 3^{\frac{3}{4}x}$

$4x+12 = \frac{3}{4}x$

$16x+48 = 3x$

$13x = -48$

$x = -48/13$

(d) $2^{6(x-1)} = 2^{5(2x-3)}$

$2^{6x-6} = 2^{10x-15}$

$6x-6 = 10x-15$

$-4x = -9$

$x = 9/4$

(f) $81^{2x+3} = (\sqrt[4]{3})^{x}$

$(3^4)^{2x+3} = 3^{\frac{1}{4}x}$

$3^{8x+12} = 3^{\frac{1}{4}x}$

$8x+12 = \frac{1}{4}x$

$32x+48 = x$

$32x-x = -48$

$31x = -48$

$x = \frac{-48}{31}$

(g) $(5^2)^{5x-4} = 5^{-3}$

$5^{10x-8} = 5^{-3}$

$10x-8 = -3$

$10x = 5$

$x = 5/10$

(h) $\log_2(5x+14) - \log_2(x-6) = 4$

$\log_2 \frac{5x+14}{x-6} = 4$

$\frac{5x+14}{x-6} = 2^4$

$5x+14 = 16(x-6)$

$5x+14 = 16x-96$

$+5x-16x = -96-14$

$-11x = -110$

$x = 10$

(e). $\log_6 12x = 4$

$12x = 6^4$

$12x = 1296$

$x = 108$

(i) $\log_4(3x-2) + \log_4(x-2) = 3$

$\log_4(3x-2)(x-2) = 3$

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

$3x^2 - 8x + 4 = 64$

$3x^2 - 8x - 60 = 0$

QF or Factor

$x = -10/3$, (6.)

Inadm.

21. $y = 2(3)^{-(x+4)} - 5$

Vertical stretch 2

flipped y-axis

left 4

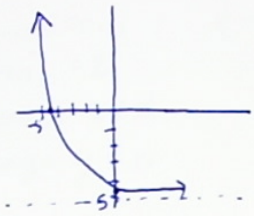
Down 5

HA $y = -5$

y-int: -4.975

Range $y \geq -5$

Domain $x \in R$



$y = 3^x$ $(x,y) \rightarrow$

Find x-int Let $y = 0$

$0 = 2(3)^{-(x+4)} - 5$

$5 = 2(3)^{-(x+4)}$

$2.5 = 3^{-(x+4)}$

$\log_3 2.5 = -(x+4)$

$0.834 = -(x+4)$

$-0.834 = x+4$

$-4.834 = x$

22. $y = -4\left(\frac{1}{2}\right)^{x-3} + 5$

VF flippid x-axis

VS = 4

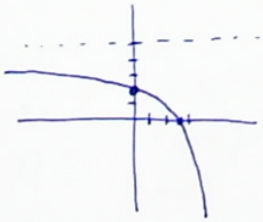
R 3

U 5

HA $y = 5$

y-int: 1

x-int = 2.68



Domain: $x \in R$

Range $y \leq 5$

$0 = -4\left(\frac{1}{2}\right)^{x-3} + 5$

$-5 = -4\left(\frac{1}{2}\right)^{x-3}$

$\frac{5}{4} = \left(\frac{1}{2}\right)^{x-3}$

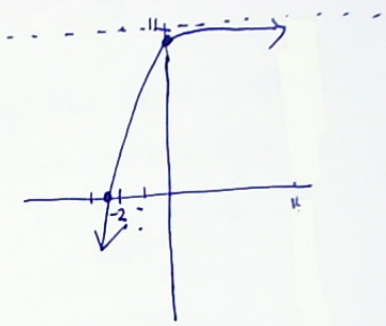
$\log_{1/2}\left(\frac{5}{4}\right) = x - 3$

$2.68 = x$

23. $y = -6(2)^{-3(x+2)} + 11$

flipped x-axis
flipped y-axis
HA $y = 11$
VS = 6
HS = $1/3$
L 2
U 11

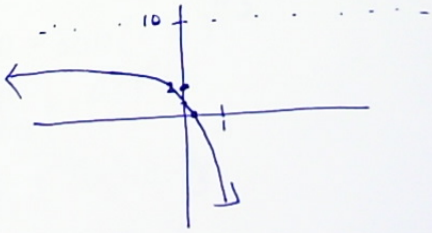
x-int: -2.29
y-int 10.9
Domain $x \in R$
Range $y < 11$



24. $y = -(2)^{3(x+1)} + 10$

flipped x-axis
HS = $1/3$
L 1
U 10
HA $y = 10$

x-int = 0.11
y-int = 2
Domain $x \in R$
Range $y < 10$



25. $y = 6\log_4(x+2) - 7$

VS = 6 VA $x = -2$.
L 2
D 7
Domain $x > -2$
Range $y \in R$

x-int $0 = 6\log_4(x+2) - 7$
$7 = 6\log_4(x+2)$
$7/6 = \log_4(x+2)$
$4^{7/6} = x+2$
$4^{7/6} - 2 = x$
$x = 3.04$

y-int
$y = 6\log_4(0+2) - 7$
$= 6\log_4 2 - 7$
$= -4$

26. $\log_b \frac{x^5 \cdot x^6 \cdot x^9}{x^{3/4} \cdot x^{1/4}}$

$\log_b \frac{x^{20}}{x^{4/4}}$

$\log_b x^{19/4}$

$= \log_b x$

27. $3.6045 \log s = \log m - 3.4425$

$s = 0.56$

$3.6045 \log 0.56 = \log m - 3.4425$

$3.6045 \log 0.56 + 3.4425 = \log m$

$2.5348 = \log m$

$10^{2.5348} = m$

$m = 342.6$

28. $10000 = 250(1.025)^{3t}$

$40 = 1.025^{3t}$

$\log_{1.025} 40 = 3t$

$149.39 = 3t$

$t = 49.8 \text{ yrs}$

29. $D = 300(0.81)^{t/3}$

$20 = 300(0.81)^{t/3}$

$\frac{20}{300} = 0.81^{t/3}$

$\log_{0.81}\left(\frac{20}{300}\right) = \frac{t}{3}$

$12.85 = \frac{t}{3}$

$t = 38.55 \text{ days}$

30. $B = 20(0.988)^t + 17$

(a) $t = 0$ $B = 20(0.988)^0 + 17$

$= 37°$

(b) $22 = 20(0.988)^t + 17$

$5 = 20(0.988)^t$

$0.25 = 0.988^t$

$\log_{0.988} 0.25 = t$

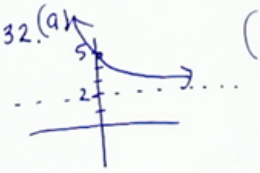
$t = 114.8 \text{ min}$

31. $V = 15600(0.82)^t$

$= 15600(0.82)^5$

$= \$5783.54$

32. (a)



(b)

1. A a. 150° $\frac{150\pi}{180}$ $\frac{5\pi}{6}$ b. -385° $\frac{-385\pi}{180}$

B. a. 63° $\frac{63\pi}{180}$ $= 1.10$ b. -214° $\frac{-214\pi}{180}$ $= 3.74$

2. a. $\frac{11\pi}{6} \times \frac{180}{\pi}$ $= 330^\circ$ b. $\frac{4}{15}\pi \times \frac{180}{\pi}$ $= 48^\circ$ c. $-\frac{13}{18}\pi \times \frac{180}{\pi}$ -130° d. 4.17 rad $4.17 \times \frac{180}{\pi}$ $= 238.9^\circ$ e. 0.97 rad $0.97 \times \frac{180}{\pi}$ $= 55.6^\circ$

3. a. quad 2 b. quad 2 c. $\tan\theta = \frac{-y}{-2}$ $= +y/x$

d. $(-8, -6)$ $h^2 = (-8)^2 + (-6)^2$ $h = 10$ $\cos\theta = \frac{-8}{10} = -4/5$

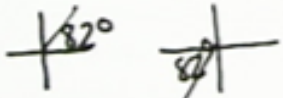
e. $\tan\theta = 4.7046$ $\theta = \tan^{-1} 4.7046$ $\theta = 78^\circ$ 258° $-282^\circ, 78^\circ, 438^\circ$ $-102^\circ, 258^\circ, 618^\circ$

f. $\sin\theta = -0.5300$ ref $\angle\ \theta = \sin^{-1}(0.5300)$ ref $\angle = 32^\circ$ sin is (-) 212° 328° $-148^\circ, 212^\circ, 572^\circ$ $-32^\circ, 328^\circ, 688^\circ$

g. $\sec\theta = 2.000$ $\cos\theta = \frac{1}{2}$ $\cos\theta = 0.5$ $\theta = 60^\circ$ 300° $-\frac{5\pi}{3}, \frac{\pi}{3}, \frac{7\pi}{3}$ $-\frac{\pi}{3}, \frac{5\pi}{3}, \frac{8\pi}{3}$

4. a. $\tan\theta = 7.1154$

$\theta = 82°$

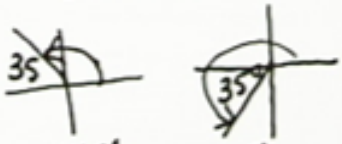


82°, 262°

b. $\cos\theta = -0.8192$

ref $\theta = 35°$

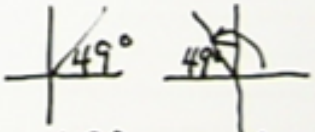
cos is (−)



c. $\csc\theta = 1.3250$

$\sin\theta = \frac{1}{1.3250}$

$\theta = 49°$



5. a. $\sin\theta \sec\theta \cot\theta = 1$

$\sin\theta \cdot \frac{1}{\cos\theta} \cdot \frac{\cos\theta}{\sin\theta} = 1$

$1 \cdot 1$

b. $\sin x + \frac{\cos^2 x}{\sin x} = \csc x$

$\frac{\sin^2 x}{\sin x} + \frac{\cos^2 x}{\sin x} = \csc x$

$\frac{1}{\sin x} = \csc x$

$\csc x = \csc x$

c. $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = 2\sec^2\theta$

$\frac{1-\sin\theta + 1+\sin\theta}{(1+\sin\theta)(1-\sin\theta)} = 2\sec^2\theta$

$\frac{2}{1-\sin\theta+\sin\theta-\sin^2\theta} = 2\sec^2\theta$

$\frac{2}{1-\sin^2\theta} = 2\sec^2\theta$

$\frac{2}{\cos^2\theta} = 2\sec^2\theta$

$2\sec^2\theta = 2\sec^2\theta$

d. $\cos\theta \tan\theta \sec^2\theta \cot\theta = \sec\theta$

$\cos\theta \cdot \frac{\sin\theta}{\cos\theta} \cdot \frac{1}{\cos^2\theta} \cdot \frac{\cos\theta}{\sin\theta} = \sec\theta$

$\frac{1}{\cos\theta} = \sec\theta$

$\sec\theta = \sec\theta$

e. $\sec\theta - \tan\theta = \frac{1-\sin\theta}{\cos\theta}$

$\frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta} = \frac{1-\sin\theta}{\cos\theta}$

$\frac{1-\sin\theta}{\cos\theta} = \frac{1-\sin\theta}{\cos\theta}$

f. $\frac{\cot\theta}{\csc\theta \sec\theta} = \cos^2\theta$

$\sin\theta \cos\theta \frac{\cos\theta}{\sin\theta} = \cos^2\theta$

$\cos^2\theta = \cos^2\theta$

$\frac{\frac{\cos\theta}{\sin\theta}}{\frac{1}{\sin\theta}\cdot\frac{1}{\cos\theta}} = \frac{\frac{\cos\theta}{\sin\theta}}{\frac{1}{\sin\theta\cos\theta}}$ $\sin\theta\cos\theta$ $\sin\theta\cos\theta$ $\cos^2\theta$

6. (a) arc length = (radians)(radius)

$a = \frac{43\pi}{180} \times 15$

$a = 11.26\text{cm}$

(b). radius = $\frac{\text{arc length}}{\text{radians}}$

$= \frac{18}{3\pi/4}$

$= 7.6\text{ cm}$

8. (a) $\sin\frac{\pi}{3} + \cos\frac{5\pi}{3}$

$\frac{\sqrt{3}}{2} + \frac{-\sqrt{3}}{2}$

$= 0$

(b). $\frac{\cos 135^\circ}{\sin 330^\circ} - \frac{\sin 210^\circ}{\sec 45^\circ}$

$\frac{-\sqrt{2}/2}{-1/2} - \frac{-1/2}{2/\sqrt{2}}$

$\sqrt{2} + \frac{1}{2} \times \frac{\sqrt{2}}{2}$

$\sqrt{2} + \sqrt{2}/4$

$= \frac{5\sqrt{2}}{4}$

(c). $\sin^2 210^\circ + \tan 135^\circ \sin 330^\circ$

$(-1/2)^2 + \frac{\sqrt{2}/2}{-\sqrt{2}/2} \cdot -1/2$

$1/4 - 1(-1/2)$

$1/4 + 1/2$

$3/4$

d. $\csc\frac{2\pi}{3}\cos\frac{11\pi}{6} - \sin\frac{\pi}{4}\cos\frac{3\pi}{4}$

$2/\sqrt{3} \cdot \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \cdot \frac{-\sqrt{2}}{2}$

$1 + 2/4$

$1 + 1/2 = 3/2$

e. $\sin^2 60^\circ + \cos^2 60^\circ - \tan^2 60^\circ$

$\left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2 - \left(\frac{\sqrt{3}/2}{1/2}\right)^2$

$\frac{3}{4} + \frac{1}{4} - \left(\sqrt{3}\right)^2$

$1 - 3 = -2$

f. $\sqrt{2}\sec 765^\circ \cos 600^\circ - 4\sqrt{3}\tan 690^\circ$

$\sqrt{2} \cdot \frac{2}{\sqrt{2}} \cdot -1/2 + 4\sqrt{3} \cdot \frac{-1/2}{\sqrt{3}/2}$

$-1 + 4\sqrt{3} \cdot \frac{1}{\sqrt{3}}$

$-1 + 4$

3

g. $\cot\frac{5\pi}{4}\cos\frac{5\pi}{3} - \sin\frac{3\pi}{2}\cos\pi$

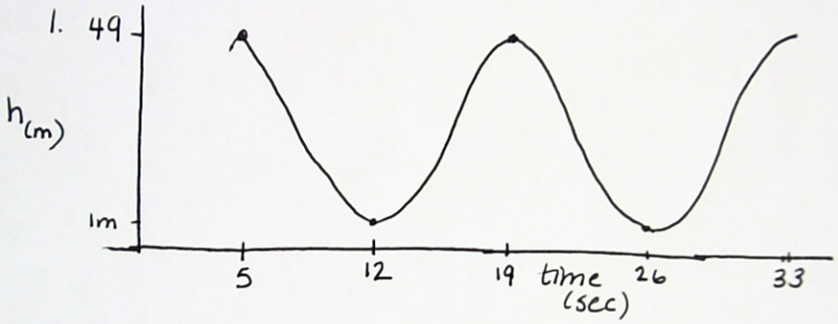
$\frac{-\sqrt{2}/2}{-\sqrt{2}/2} \cdot \frac{1}{2} - (-1)(-1)$

$1 \cdot 1/2 - 1$

$-1/2$

Trig. Part 2 Sinusoidal Functions

1.



EQ'N: Amp: 24
period: 14 $K = \frac{360}{14}$
ps: cos +5
SA $y = 25$

$y = 24\cos\frac{360}{14}(x-5)+25$

Started timing here at $x=0$ $y = 24\cos\left[\frac{360}{14}(0-5)\right]+25$

$y = 10.04m$

at 20 sec $h = 24\cos\left[\frac{360}{14}(20-5)\right]+25$

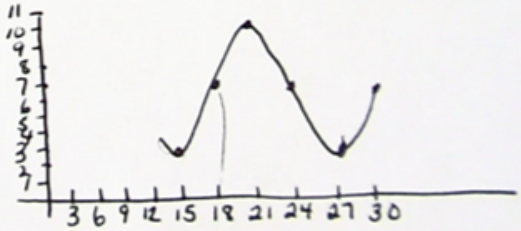
$= 46.6m$

2. $h = -4\cos 30(t-15^\circ)+7$ $(t,h) \rightarrow (\frac{1}{30}t+15, -4h+7)$

a) amp = 4
period $= \frac{360}{30} = 12$
ps: +15
SA $y = 7$
vertical trans +7
horiz. trans +15

t	h
0	1
90	0
180	-1
270	0
360	1

t	h
15	3
18	7
21	11
24	7
27	3



3. $y = 6\cos 18(\theta + 5°) - 4$

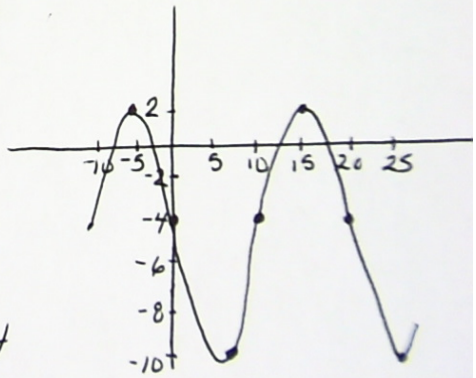
(a) Amp = 6
period = $\frac{360}{18} = 20$
SA: $y = -4$
vert. trans: $y = -4$
ph. shift -5

(b) Domain $\theta \in R$
Range: $-10 \le y \le 2$

(c) $(\theta, y) \to (\frac{1}{18}\theta - 5, 6y - 4)$

θ	y
0	1
90	0
180	−1
270	0
360	1

θ	y
−5	2
0	−4
5	−10
10	−4
15	2



(d) $\theta = 60°$ $y = 6\cos[18(60+5)] - 4$

(e) $y = 4$ $4 = 6\cos[18(\theta + 5)] - 4$

y cannot equal 4 because range is $-10 \le y \le 2$

$4 + 4 = 6\cos[18(\theta + 5)]$

$\frac{8}{6} = \cos[18(\theta + 5)]$

$\cos^{-1}(\frac{4}{3}) = 18(\theta + 15)$

↑ undefined

4. $y = -5\sin 30(\theta - 15°) + 3$

a) amp = 5

period = $\frac{360}{30} = 12$

SA: $y = 3$

vert trans up 3 (+3)

ph. sh: +15

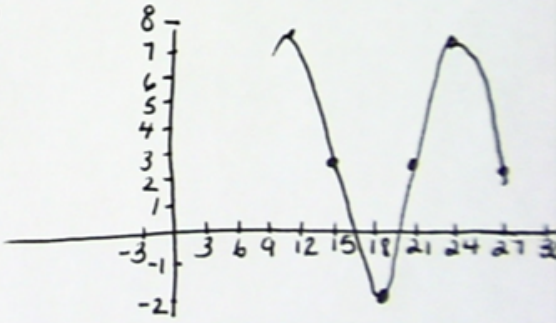
(b) Domain $\theta \in R$

Range $-2 \leq \quad < 8$

(c) $(\theta, y) \rightarrow (\frac{1}{30}\theta + 15, -5y + 3)$

θ	y
0	0
90	1
180	0
270	-1
360	0

θ	y
15	3
18	-2
21	3
24	8
27	3



(d) solve $\theta = 60$

$y = -5\sin[30(60 - 15)] + 3$

$y = 8$

(e) $y = 4$

$4 = -5\sin[30(\theta - 15)] + 3$

$4 - 3 = -5\sin[30(\theta - 15)]$

$\frac{1}{-5} = \sin[30(\theta - 15)]$

$\sin^{-1}(-0.2) = 30(\theta - 15)$ } $\sin^{-1}(-0.2) = 191.54$

$-11.54 = 30(\theta - 15)$ $\frac{191.54}{30} + 15 = \theta$

$\frac{-11.54}{30} = \theta - 15$

$\frac{-11.54}{30} + 15 = \theta$

$14.6 = \theta$

just 1 angle

$\theta = 14.6, 26.6 \ldots$ $14.6 \pm 12k$

OR

$21.38 \pm 12k$

5. (a) Amp: 5
period: 16 $K = \frac{360}{16} =$
ps: sin 0, 16
cos 4, 20
SA: $y = 3$

$y = 5\sin 22.5(\theta - 16) + 3$ $y = 5\cos 22.5(\theta - 4) + 3$
$(\theta - 20)$

(b) Amp = 6
period 18 $K = \frac{360}{18} = 20$
ps: sin 4.5, 22.5
cos 9, 27
SA: $y = 8$

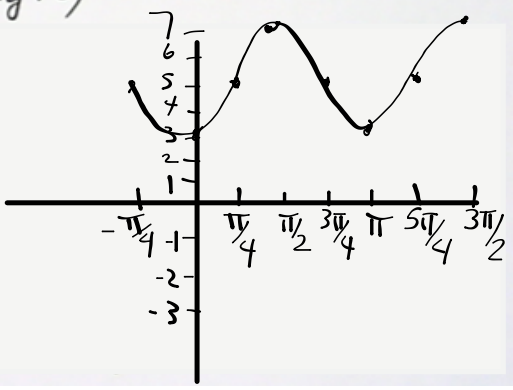
$y = 6\sin 20(x - 4.5) + 8$ $y = 6\cos 20(x - 9) + 8$

6. $y = 2\sin 2(\theta - \pi/4) + 5$

$(\theta, y) \rightarrow (\frac{1}{2}\theta + \frac{\pi}{4}, 2y + 5)$

θ	y
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3}{2}\pi$	-1
2π	0

θ	y
$\pi/4$	5
$2\pi/4$	7
$3\pi/4$	5
$4\pi/4$	3
$5\pi/4$	5



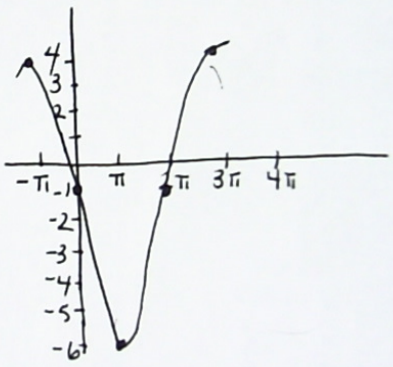
6 (b) same as (a)

(c) $y = 5\cos\frac{1}{2}(\theta+\pi)-1$

$(\theta, y) \rightarrow (2\theta-\pi, 5y-1)$

θ	y
0	1
$\frac{\pi}{2}$	0
π	-1
$\frac{3}{2}\pi$	0
2π	1

θ	y
$-\pi$	4
0	-1
π	-6
2π	-1
3π	4



7. $y = \frac{1}{4}\sin\frac{1}{9}(\theta-15)-3$

$y = -12\sin 4(\theta - 10) + 2$

for $y = -4$

$-4 = -12\sin 4(\theta - 10) + 2$

$\frac{-6}{-12} = \frac{-12\sin 4(\theta - 10)}{-12}$

$0.5 = \sin 4(\theta - 10)$

$\sin^{-1} 0.5 = 4(\theta - 10)$

30 or 150

① $\frac{30}{4} = \frac{4(\theta - 10)}{4}$ or $150 = 4(\theta - 10)$

$7.5 = \theta - 10$ $37.5 = \theta - 10$

$17.5 = \theta$ $47.5 = \theta$

* $\sin^{-1} 0.5$

30°

period $360/4 = 90$

* sin is +

30° 150°

Every single ∠:

$17.5 + 90x$

$47.5 + 90x$

$y = 5\cos 2(\theta + 3) + 6$

Solve for $y = 2$

$2 = 5\cos 2(\theta + 3) + 6$

$2 - 6 = 5\cos 2(\theta + 3)$

$\frac{-4}{5} = \cos 2(\theta + 3)$

$-0.8 = \cos 2(\theta + 3)$

$\cos^{-1}(-0.8) = 2(\theta + 3)$

① $143 = 2(\theta + 3)$ or ② $217 = 2(\theta + 3)$

$\theta = 68.5$ $\theta = 105.5°$

* $\cos^{-1}(-0.8)$

ref ∠ $\cos^{-1}(0.8)$

36.9°

37°

37° 37°

143° 217°

period $\frac{360}{2} = 180$

$68.5 + 180k$

$105.5 + 180k$

$y = \sin\theta$

θ	y
0	0
$\pi/2$ 90	1
π 180	0
$3\pi/2$ 270	-1
2π 360	0