

SOLUTIONS

MHF4Uss -- Exam Review

1. Factor fully

- $8(x - 2)(x^2 + 2x + 4)$
- $(3x^2 - 4y)(9x^4 + 12x^2y + 16y^2)$
- $3(2x + 1)(4x^2 - 2x + 1)$
- $(5x - 2y + 7)(5x - 2y - 7)$
- $(x - 1)(x + 2)(3x - 1)$
- $(x + 2)^2(3x + 2)$
- $(x - 2)(x + 1)(2x - 3)(5x - 2)$

2. Determine an equation for the graph of the polynomial functions below.

a) $f(x) = -\frac{1}{10}(x + 4)(x + 2.5)(x - 2)(x - 5)$

b) $f(x) = -2(x + 2)(x - 1)^2$

3. a) yes.
b) no.
c) no.

4. Determine the oblique asymptote of:

- $y = x - 2$
- $y = 3x - 4$
- $y = 4x - 33$
- $y = 3x - 17$

5. Solve for x:

- $x = 84$
- $x = 6$
- $x = 0$
- $x = 6$
- $x = 5$

6. Evaluate using the properties of logarithms.

- 1
- 2
- 0.6826
- 4

7. For the following functions: a. State the y-intercept
b. State the horizontal asymptote.

- $(0, -6)$ $y = -4$
- $(0, 1)$ $y = -2$
- $(0, 3.5)$ $y = 3$
- $(0, -11)$ $y = -18$

8. Given the graph of the functions $f(x)$ shown below

- Write an equation that expresses the function as a cosine function
- Write an equation that expresses the function as a sine function

9. Use the appropriate compound angle formula to evaluate the following:

a) $\frac{1+\sqrt{3}}{2\sqrt{2}}$

d) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

b) $\frac{1}{2}$

e) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

c) $\frac{1+\sqrt{3}}{2\sqrt{2}}$

f) $\frac{1+\sqrt{3}}{2\sqrt{2}}$

10.

a. 50

b. $\frac{1}{30}$

c. $f(x) = 50 \cos 60\pi x + 50$

11.

a. 6

b. $\frac{1}{100}$

c. $f(x) = -6 \cos 200\pi x$

12.

These solutions are in minutes. You could have converted and used seconds instead

a. $f(x) = 40 \sin 5\pi \left(x - \frac{1}{10}\right) + 42$ or $f(x) = 40 \cos 5\pi \left(x - \frac{1}{5}\right) + 42$

b. 13.72m

13.

a. 1995

b. 1998

c. 5 571 687 554

d. No. In real life, the number of users will plateau.

14. \$1830.21

15. 2023

16.

a.	Amplitude: 2	Phase shift: $\frac{\pi}{12}$ right	Vert. Trans. 1 up	Period: $\frac{2\pi}{3}$
b.	Amplitude: 4	Phase shift: 2 right	Vert. Trans. 7 down	Period: 12
c.	Amplitude: 2	Phase shift: 3 right	Vert. Trans. 2 up	Period: $\frac{\pi}{2}$
d.	Amplitude: 1	Phase shift: $\frac{\pi}{3}$ right	Vert. Trans. 1 up	Period: 4π

17. *Solutions are given for sine, but the question does not specify, so they could be any trig function*

a. $f(x) = 20 \sin \frac{10\pi}{3}(x + 1.25)$

b. $f(x) = 2 \sin 2 \left(x + \frac{\pi}{2}\right)$

c. $f(x) = 15 \sin \frac{20\pi}{17}(x - 2.9)$

18. *Solutions will vary*

19. -219.8L/min

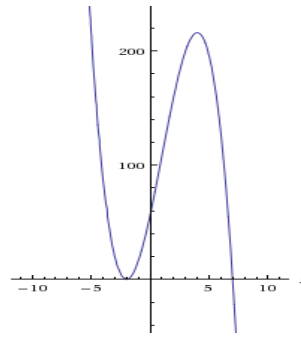
20.

a. -2.5m/s

b. -2.7m/s

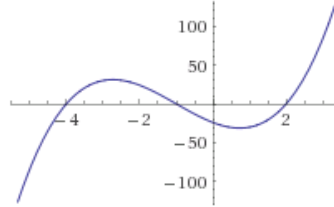
21.

- a. 3
- b. $x = -2$ (double root) $x = 7$ (single root)
- c. (0,56)
- d. sketch the function.



22.

- a. 3
- b. $x = -1, x = 2, x = -4$ (all single roots)
- c. (0, -24)
- d. sketch the function.



23.

- a. $x = 2$
- b. $x = 2$
- c. $\theta = 0.841$ rad, or $\theta = 5.442$
- d. $x = 14.43$
- e. $x = 4.79$

24. Determine an exact value for the following

- a. $\frac{1}{\sqrt{2}}$
- b. $\frac{\sqrt{3}}{2}$
- c. $\sqrt{3}$
- d. $\frac{-1}{2}$
- e. $-\sqrt{2}$
- f. *undefined*
- g. $\frac{1}{\sqrt{3}}$
- h. $\frac{-2}{\sqrt{3}}$

MHF4Uss -- Exam Review Part II

1.

a. $\frac{84}{85}$

b. $\frac{21}{17}$

c. $\frac{143}{79}$

2.

a. $\frac{-63}{65}$

b. $\frac{-12}{65}$

c. $\frac{-24}{25}$

3.

a. $\frac{5\sqrt{3}-12}{26}$

b. $\frac{12\sqrt{3}+5}{26}$

c. $\frac{169}{119}$

4.

a. $-2 \leq x \leq 2$ and $x \leq -3$

b. $x > 6$ and $-2 < x < 5$ and $x < -4$

c. $x \geq 1$ and $-3 \leq x \leq -2$

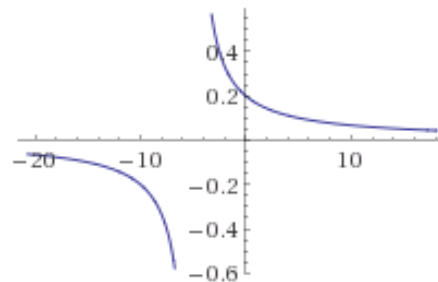
d. $2 < x < 5$ and $x < -1$

5.

a. There are no x or y intercepts, but there is a hole at (0, 0.2)

b. $x = -5$

c. $y = 0$ (horizontal asymptote)

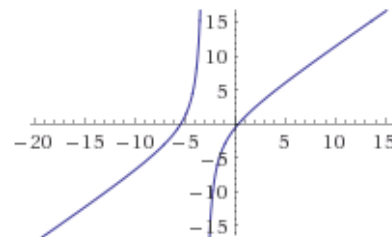
d. Sketch the graph of $R(x)$.

6.

a. x-ints: (0.37, 0) and (-5.37, 0) y-int: (0, -2/3)

b. $x = -3$

c. $y = x + 2$

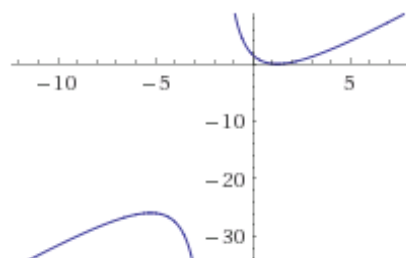
d. Sketch the graph of $R(x)$.

7.

a. x-ints: (1.5, 0) and (2, 0) y-int: (0, 1.5)

b. $x = -2$

c. $y = 2x - 9$

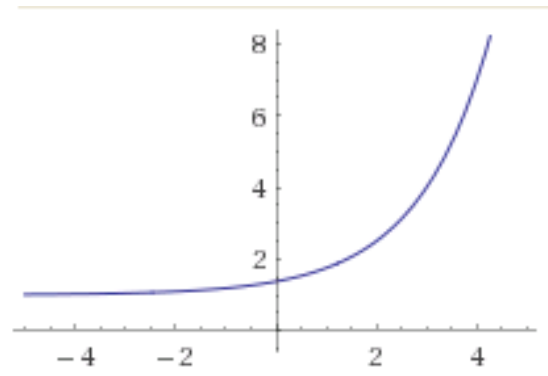
d. Sketch the graph of $R(x)$.

8.

Base Function	
$y = 2^x$	
x	y
-2	0.25
-1	0.5
0	1
1	2
2	4

→
→
→
→
→
→

Transformed Function	
$y = 3(2)^{x-3} + 1$	
$x+3$	$3y+1$
1	1.75
2	2.5
3	4
4	7
5	13

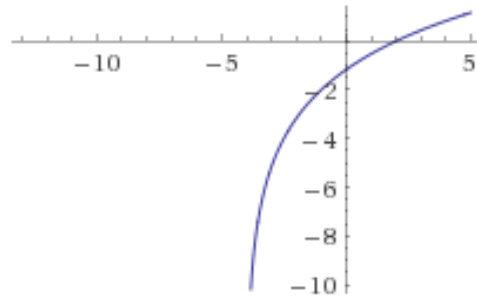


9.

Base Function	
$y = \log_2 x$	
x	y
0.25	-2
0.5	-1
1	0
2	1
4	2

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→

Transformed Function	
$y = 2\log_2 \frac{1}{3}(x+4) - 2$	
$3x-4$	$2y-2$
-3.25	-6
-2.5	-4
-1	-2
2	0
8	2

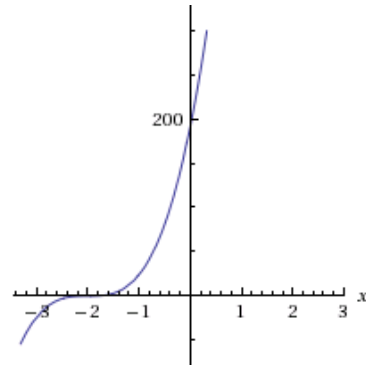


10.

Base Function	
$y = x^3$	
x	y
-2	-8
-1	-1
1	0
1	1
2	8

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→
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Transformed Function	
$y = 3[2(x+2)]^3 - 1$	
$0.5x-2$	$3y-1$
-3	-25
-2.5	-4
-2	-1
-1.5	2
-1	23

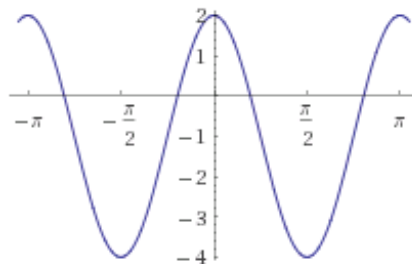


11.

Base Function	
$y = \sin x$	
x	y
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

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→
→

Transformed Function	
$y = 3 \sin(2x + \frac{\pi}{2}) - 1$	
$0.5x - \frac{\pi}{4}$	$3y-1$
$-\frac{\pi}{4}$	-1
0	2
$\frac{\pi}{4}$	-1
$\frac{\pi}{2}$	-4
$\frac{3\pi}{4}$	-1



12.

Base Function	
$y = \cos x$	
x	y
0	1
$\frac{\pi}{2}$	0
π	-1
$\frac{3\pi}{2}$	0
2π	1

→

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→

Transformed Function	
$y = -\cos 3\left(x - \frac{\pi}{6}\right) + 4$	
$\frac{1}{3}x + \frac{\pi}{6}$	$-y + 4$
$\frac{\pi}{6}$	3
$\frac{\pi}{3}$	4
$\frac{\pi}{2}$	5
$\frac{2\pi}{3}$	4
$\frac{5\pi}{6}$	3

