Math1090 Midterm 3 Review
Sections 3.4, 3.6, 3.7, 4.1-4.5, 5.1

1. Given the polynomial function $y=4x^4-16x^2$, answer the following questions.
(a) What is its degree?
(b) What is its leading coefficient?
(c) Find the y-intercept.
(d) Find the x-intercepts.
(e) Sketch the graph of this function.

2. Answer these questions for the following functions.
(1) What is the parent function?
(2) Horizontal shift? yes or no _____units to the right or left
(3) Vertical shift? yes or no _____units up or down
(4) Horizontal reflection: Yes or No
(5) Vertical reflection: Yes or No
(6) Horizontal Stretch or Shrink? Stretch or Shrink or None
(7) Vertical Stretch or Shrink? Stretch or Shrink or None
(8) List any asymptote this function has.
(9) What is the domain?
(10) Sketch the graph.

(a) $g(x)=-0.5|x+1|-4$
(b) $h(x)=\sqrt{-x}+3$
(c) $k(x)=-2^{x-2}$
(d) $m(x)=\log_3(x+4)-1$

3. Given the functions $f(x)=(2-x)^3+5$, $g(x)=\frac{1}{\sqrt{x+3}}$, $h(x)=\frac{2-x}{x+5}$ find the following.

(a) $(f\circ g)(x)$
(b) $(f+h)(1)$
(c) $(gh)(2)$
(d) $h(f(x))$
(e) The domain of $h(x)$
(f) The domain of $g(x)$
(f) $(h-g)(1)$
(g) $h^{-1}(x)$
(h) $f^{-1}(x)$

4. Use log properties to completely condense this expression. $\log_2 x+5\log_2 11-3\log_2(9x+1)$.

5. Use log properties to completely expand this expression. $\log_{16}\left(\frac{x^3w^5}{y^3}\right)$.

6. Use log properties and the definition of the log to simplify this expression without a calculator.
$\log_5\left(\frac{1}{625}\right)\cdot 5^{\log_5 99}$

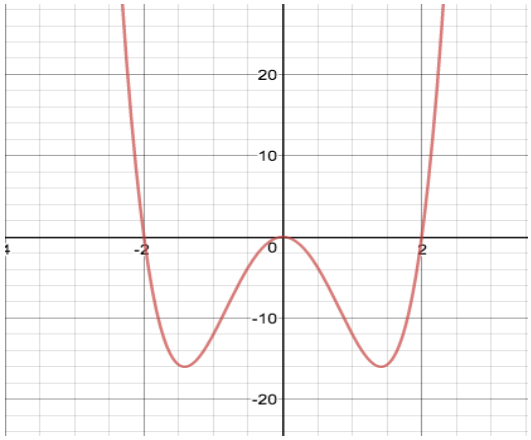
7. Solve the following equations. Give the EXACT answers, not the approximated, calculator values.
(a) $\log_3(x+5)+\log_3 1=\log_3(4x)+\log_3 2$
(b) $5e^{2x-3}+8=28$

8. Given the arithmetic sequence -2, 1, 4, 7, ... , answer the following questions.
(a) What is the common difference?
(b) What is a formula for the sequence term?
(c) Find the sum of the first 20 terms.

9. For the geometric sequence 5, 15, 45, 135, ... , answer the following questions.
(a) What is the common ratio (or quotient)?
(b) What is the formula for the sequence term?
(c) Find the 12th term of the sequence.

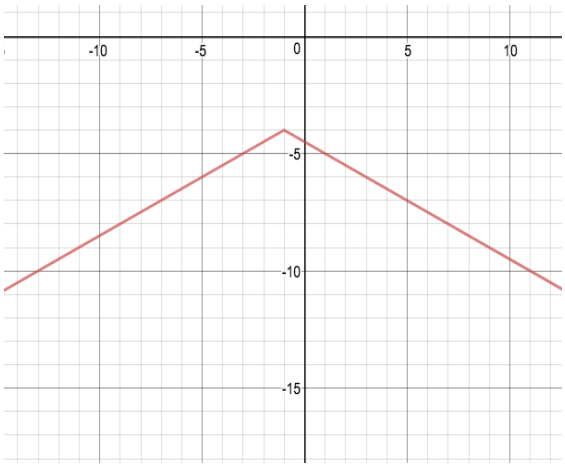
Answer Key:

1. (a) 4
(b) 4
(c) (0,0)
(d) (0,0), (-2,0), (2,0)
(e)



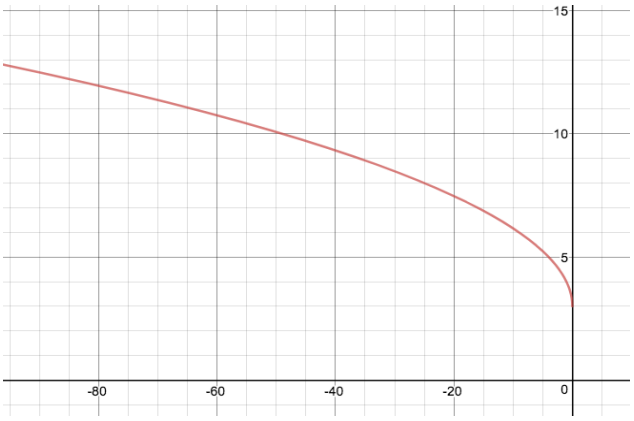
2. $g(x)=-0.5|x+1|-4$

(a) (1) $y=|x|$
(2) yes, left 1
(3) yes, down 4
(4) no
(5) yes
(6) no
(7) yes, shrink in half
(8) none
(9) all real numbers
(10)



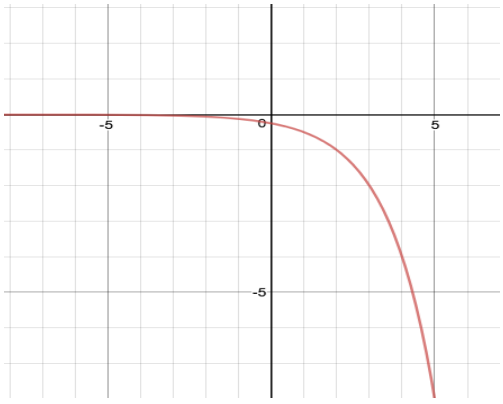
(b) $h(x)=\sqrt{-x}+3$

(1) $y=\sqrt{x}$
(2) no
(3) yes, up 3
(4) yes
(5) no
(6) none
(7) none
(8) none
(9) $x\leq 0$
(10)



(c) $k(x)=-2^{x-2}$

(1) $y=2^x$
(2) yes, 2 to the right
(3) no
(4) no
(5) yes
(6) none
(7) none
(8) HA at y = 0
(9) all real numbers
(10)



(d) $m(x)=\log_3(x+4)-1$

(1) $y=\log_3 x$

(2) yes, 4 to the left

(3) yes, down 1

(4) no

(5) no

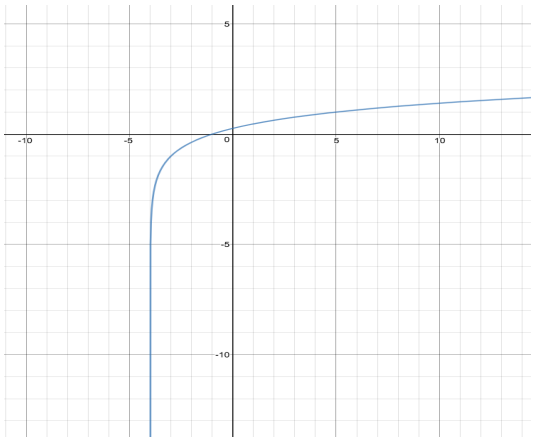
(6) none

(7) none

(8) VA at x = -4

(9) $x>-4$

(10)



3. (a) $(f\circ g)(x)=\left(2-\frac{1}{\sqrt{x+3}}\right)^3+5$

(b) $(f+h)(1)=\frac{37}{6}$

(c) $(gh)(2)=0$

(d) $h(f(x))=\frac{-3-(2-x)^3}{(2-x)^3+10}$

(e) $x\neq -5$

(f) $x>-3$

(f) $(h-g)(1)=\frac{-1}{3}$

(g) $h^{-1}(x)=\frac{2-5x}{x+1}$

(h) $f^{-1}(x)=2-\sqrt[3]{x-5}$

4. $\log_2\left(\frac{11^5 x}{(9x+1)^3}\right)$

5. $3\log_{16}x+5\log_{16}w-3\log_{16}y$

6. -396

7. (a) $x=\frac{5}{7}$

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

8. (a) 3

(b) $a_n=3\mathrm{n}-5$, $n=1,2,3,...$

(c) 530

9. (a) 3

(b) $a_n=5\left(3^{n-1}\right)$, $n=1,2,3,...$

(c) 885,735