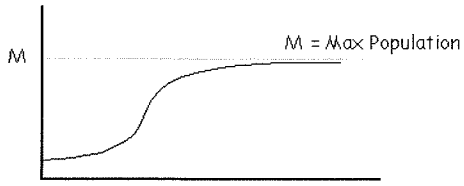
Pre Calculus/ College Algebra Final Exam Fall 2014 Name

4. Logistic Equation

$y' = ky(1-\frac{y}{M})$

-15



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$y(t) = \frac{M}{1+Ae^{-kt}}$

B 1. Given the function , identify the range.

A. (0,M) B. $(-\infty, \infty]$ C. [0, A) D. Answer is not here.

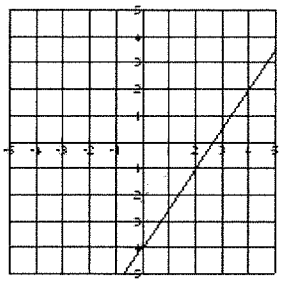
B 2. Identify the linear function.

A. $f(x) = -4x + \frac{5}{2}$

B. $f(x) = \frac{3}{2}x - 4$

C. $f(x) = \frac{5}{2}x - 4$

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



C 3. Use the factor theorem to determine if x – 4 is a factor of $2x^3 - 18x + 16$.

A. x – 4 is *not* a factor since R = 0
B. x – 4 is a factor since R = 0
C. x – 4 is *not* a factor since R ≠ 0
D. x – 4 is a factor since R ≠ 0

D 4. For $f(x) = x^2 + 1$ and $g(x) = x + 4$, find g (f(x)).

A. $y = x^2 + 5$ B. $y = x^3 + 4x^2 + x + 4$ C. $x^2 + 4$ D. $x^2 + 8x + 17$

a 5. Solve $[x-(4x + 2)] = 2 + (2x + 7)$

A. $x = \frac{7}{2}$ B. $x = \frac{3}{2}$ C. x = 7 D. x = -2.2

3

C 6. Solve $4|x - 3.5| = -2$.

A. $x = -1$ B. $x = -3$ or $x = -4$ C. $x = 3$ or $x = 4$ D. no solution

D 7. For the linear function $f(x) = x + ½$, what is the zero of f?

A. -1/8 B. -2 C. 1/8 D. -½

C 8. For $f(x) = \frac{2x^3+1}{x-4}$, identify the horizontal asymptote.

A. $y = 2$ B. $y = -1$ C. $y = -4$ D. There isn't one it's oblique.

a 9. Solve for x: $32^x = 16^{1-x}$

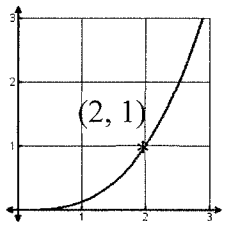
A. $x = \ln 3$ B. $x = 3$ C, $x = 1/3$ D. $x = 4/9$

B 10. $f(x) = 3(x - 4)$. Find the inverse function f^{-1}.

A. $f^{-1}(x) = \frac{x}{3} + 4$ B. $f^{-1}(x) = 2x - 3$ C. $f^{-1}(x) = 4x - \frac{1}{3}$ D. f^{-1} does not exist.

a 11. If the graph is symmetric with respect to the origin, what are the coordinates of another point on the graph?

A. (-2, 1)
B. (-2, -1)
C. (1, 2)
D. (-1, -2)



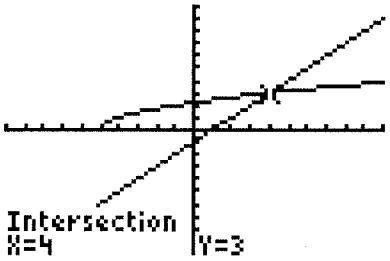
C 12. Describe the graph of the parabola $-2x^2 - 8x - 24 = 0$.

A. opens down vertex (2,-16) reflected about the y axis, stretch factor of 2
B. opens down, vertex (-2, -16), reflected about the x axis stretch factor of 2.
C. opens down, vertex (-2, 16), reflected about the y axis stretch factor of -2.
D. opens down, vertex (-2, -16), reflected about the y axis stretch factor of 2.

B 13. Use the calculator graph to help you determine the solution set of

$$x - 1 < \sqrt{x+5}$$

A. $(-\infty, 4]$
B. $[3, \infty,)$
C. $(-5, 4)$
D. $(4, \infty)$

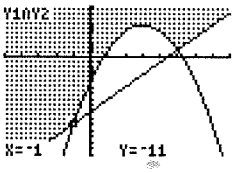


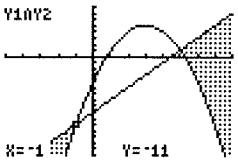
A 14. According to one model, the rate at which an animal's heart beats varies with its weight. The table lists average pulse rates in beats per minute (bmp) for animals with various weights in pounds. Use a power regression to find an equation to model this data, then use it to predict the weight (to the nearest pound) of an animal with a heartbeat of 100 bpm.

Weight in lbs	40	150	400	1000	2000
Pulse in bpm	141	72	44	28	20

A. 205 lbs.
B. 88.6 lbs.
C. 300 lbs.
D. 78.5 lbs.

D 15. Which of the following shows the solution space for the system of inequalities $y - 2x \leq -9$, $y \geq -x^2 + 6x - 4$?

A.


B.


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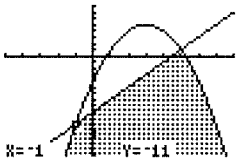
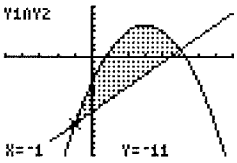


D.


B 16. Write a description of how the graph of $y = -2\sqrt{x-3} + 5$ can be obtained by transforming the graph of $y = \sqrt{x}$

A. reflect $\sqrt{x}$ over the x-axis, stretch 2, shift right 3, up 5

B. shift $\sqrt{x}$ down 2, left 3 then up 5

C. reflect $\sqrt{x}$ over the x-axis, stretch 2, shift left 3, up 5

D. none of these

C 17. Find the equation of the line passing through the point (0, 5) and perpendicular to the line with equation $y = 2x - 1$.

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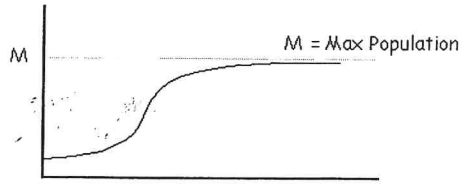
4. Logistic Equation

$y' = ky(1-\frac{y}{M})$



$y(t) = \frac{M}{1+Ae^{-kt}}$

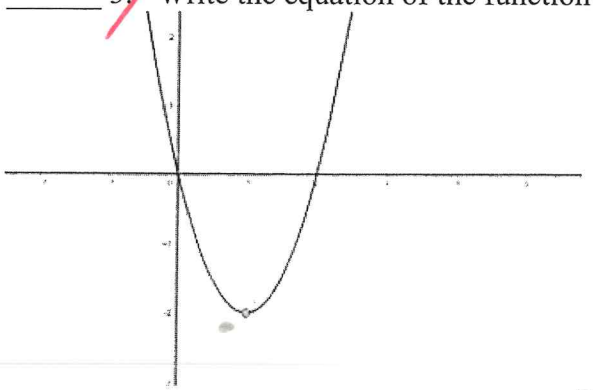
C 1/2 1. Given the function above, identify the range.

A. (0, M) B. ~~(-∞, ∞]~~ C. [0, A) D. ~~(M/2)~~ E. Answer is not here.
F. Not enough information

A 2. Given the function above, what is the domain.

A. (0,M) B. All Real numbers C. [0,A) D. (M/2) E. Answer is not here
F. Not enough information

_____ 3. Write the equation of the function in vertex form.



(2, -2)

(2, -2)

C 4. Use the factor theorem to determine if x – 4 is a factor of $2x^3 - 18x + 16$.

4| 2 -18 16
8
2

A. x – 4 is *not* a factor since R = 0
B. x – 4 is a factor since R = 0
C. x – 4 is *not* a factor since R ≠ 0
D. x – 4 is a factor since R ≠ 0
E. not enough information
F. Answer is not here

A 5. For $f(x) = x^2+1$ and $g(x) = x + 4$, find g (f(x)).

A. $y = x^2 + 5$ B. $y = x^3 + 4x^2+x+4$ C. $x^2 + 4$ D. $x^2 + 8x + 17$
E. all of the answers F. none of the answers

2.5

$g(x^2+1) = (x^2+1)+4$

$g(x^2+1) = x^2+5$

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$[x-(4x+2)] = 2+(2x+7)$

$x-4x+2 = 9+2x$

$5x = 7$

B 6. Solve [x-(4x +2)] = 2 + (2x +7)

A. x = $\frac{7}{2}$ B. x = $\frac{3}{2}$ C. x = 7 D. x = -2.2

E. All real numbers F. no solution

$4|x-3.5|=2$

$4|x-3.5|=-2$

$4x-3.5=-2$

F 7. Solve 4|x - 3.5| = -2

A. x = -1 B. x = -3 or x = -4 C. x = 3 or x = 4 D. x = 3 only

E. All real numbers F. No solution

E 8. For the polynomial, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x- axis at each x – intercept. $f(x) = 3(x+6)(x+5)^4$

A. 6, multiplicity 1 touches x-axis; 5, multiplicity 4, crosses x- axis

B. -6, multiplicity 1 crosses x-axis; 5, multiplicity 4, crosses x- axis

C. 6, multiplicity 1 crosses x-axis; 5, multiplicity 4, touches x- axis

D. 6, multiplicity 1 touches x-axis; 5, multiplicity 4, touches x- axis

E. -6, multiplicity 1 touches x-axis; -5, multiplicity 4, crosses x- axis

F. -6, multiplicity 1 crosses x-axis; -5, multiplicity 4, touches x- axis

D 9. For $f(x)= \frac{2x^3+1}{x-4}$, identify the horizontal asymptote.

A. y = 2 B. y = -1 C. y = -4 D. There isn't one it's oblique.

D 10. Solve for x: $32^x = 16^{1-x}$

A. x = ln 3 B. x = 3 C, x = 1/3 D. x = 4/9

$32^x = 16^{1-x}$

2^{5x} $2^{4(1-x)}$

$5x = 4-4x$

$+4x$ $+4x$

$\frac{9x}{9} = \frac{4}{9}$ $x = 4/9$

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C 11. Find the inverse of the function f(x) = $2(x-4)^2$, $x \geq 0$

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

A. $f^{-1}(x) = \sqrt{\frac{1}{2}(x-4)}$ B. $f^{-1}(x) = \frac{1}{2}\sqrt{x+4}$ C. $f^{-1}(x) = \frac{1}{2}\sqrt{x} + 4$

D. $f^{-1}(x) = \sqrt{\frac{1}{2}x} + 4$

_____12.Find the equation of the line passing through the point (8, 5) and perpendicular to the line with equation y = -1/3x – 1.

$5 = 3x(8) + b$

$5 = 24 + b$

$-24 \quad -24$

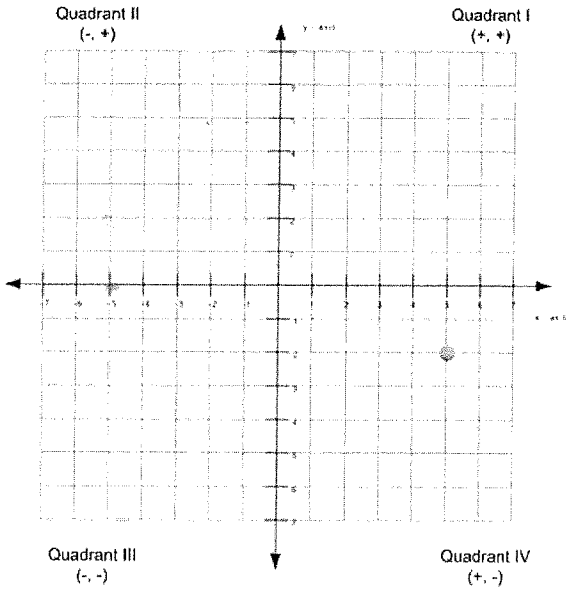
$b = -19$

$y = 3x - 19$

C 13. If the graph is odd, what are the coordinates of another point on the graph?

A. (5,2) B. (-5, -2) C. (-5,2) D) it cannot be odd.

(5, - 2) is the point given



14. Use the change of base formula to change to ln: $\log_6 7$ Give exact answer not decimal approximation.

$\log_6 7 = x$

$6^x = 7$

15. Find the zeros of the function $f(x) = x^2 - 13x - 14$

$x^2 - 13x - 14$

$(x-13)(x+1)$

$x = 13 \quad x = -1$

B 16. Describe the graph of the parabola $-2x^2 - 8x - 24 = 0$.

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D 17. Use the calculator graph to help you determine the solution set of

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less than

A. $(-\infty, 4]$
B. $[3, \infty,)$
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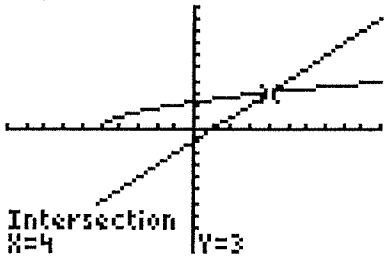
D. $(4, \infty)$



-4 _____ 18. Write a description of how the graph of $y = -\frac{1}{2}\sqrt{x-5} + 6$ can be obtained by transforming the graph of $y = \sqrt{x}$

right 5 ✓
up 6 ✓ reflected about the x-axis ✓

B 19. According to one model, the rate at which an animal's heart beats varies with its weight. The table lists average pulse rates in beats per minute (bmp) for animals with various weights in pounds. Use a **power regression** to find an equation to model this data, and then use it to predict the weight (to the nearest pound) of an animal with a heartbeat of 100 bpm.

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Pulse in pbm	141	72	44	28	20

A. 205 lbs.
B. 88.6 lbs.
C. 300 lbs.
D. 78.5 lbs.

20. What is the coefficient of determination to the thousandths place in problem #19 ?_____

$r^2 = .999$

C 21. Use synthetic division to determine the quotient and remainder for the following:
$(2x^3 + 11x^2 - 5x + 1) \div (x - 6)$

A. $Q(x) = 2x^2 + x - 11$, $R(x) = 67$
B. $Q(x) = 2x^2 - x - 11$, $R(x) = -65$
C. $Q(x) = 2x^2 - x + 1$, $R(x) = -5$
D. $Q(x) = 2x^2 + 23x + 133$, $R(x) = 799$

$$\begin{array}{r|rrrr} 6 & 2 & 11 & -5 & 1 \\ & & 12 & -6 & 6 \\ \hline & 2 & -1 & 1 & \boxed{-5/x-6} \end{array}$$

$2x^2 - x + 1$

B 22.

Use the following figure for questions 22 and 23.

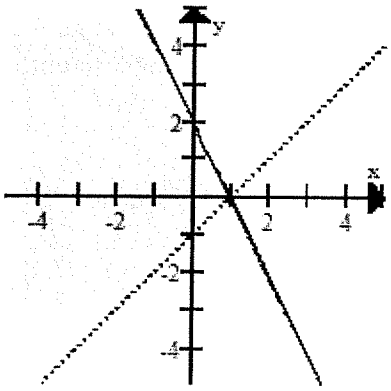
22. Which system of inequalities is graphed?

A. $y < x - 1$
$y \geq -2x + 2$

B. $y > x - 1$
$y \leq -2x + 2$

C. $y < x - 1$
$y \leq -2x + 2$

D. $y > x - 1$
$y \geq -2x + 2$



B 23. Which point is a solution to the system in the graph above.

A. (1,1) B. (1,0) C. (1,-1) D. all real numbers. E. no solution

F. Not enough information