MATH 129 **Name** ________________________________

FINAL EXAM REVIEW & KEY

Final Exam Study Suggestions

The 50 question, multiple-choice final exam consists of two parts: no calculator and calculator. To help you thoroughly study for the final exam, the mathematics department has prepared this review packet. The review contains 50 open-response questions (A) and 50 multiple-choice questions (B). After working all the open-response questions, use the multiple-choice questions as a practice test. Set aside a one hour and 50 minute block of time and complete the multiple-choice questions without using your notes, text, or a tutor. Use the answer key to check your work and pay close attention to the questions you get wrong. Additional practice on the concepts giving you difficulty is suggested. Refer to your notes or text for additional practice problems. Seek help from your instructor or a tutor.

Additional study tips are:

- Watch for sign errors!
- Check your answer in the problem.
- Final Exam problems combine ideas – think through the steps necessary to get the correct answer.
- Be sure to study ideas that look similar but are very different.
- Use the distinguishing characteristics of equations to guide you in selecting an appropriate method for solving.
- Complete the Math 129 Review in time to get help from the LAC and/or your instructor. Do not wait until the day before the Final Exam.
- Know when your final is scheduled:

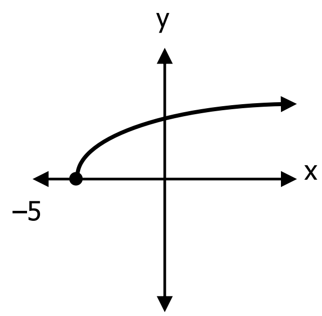
  Day and Date ______________________________

  Time ______________________________

  Room ______________________________
- Bring sharpened #2 pencils with erasers, a Scantron® Nº F-1712-PAR-L, a calculator, and your Schoolcraft ID number.
- Review questions 1–25 reflect the type of skills tested on the **NO CALCULATOR** part of the test.

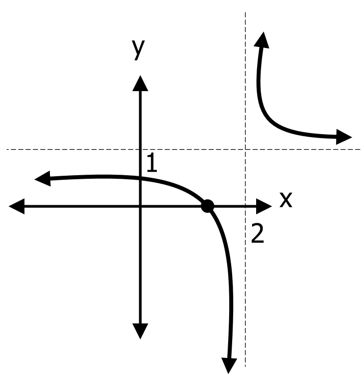
Part I – NO Calculator

1A. State the domain and range of the given function. Write your answer in interval notation.



Domain=	
Range=	

1B. State the domain of the given function.



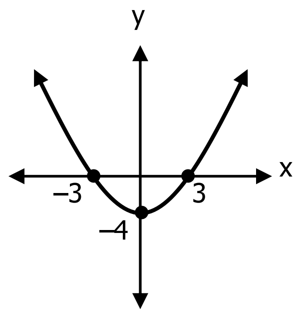
a) $(-\infty,+\infty)$

b) $(-\infty,1)\cup(1,+\infty)$

c) $(-\infty,1)\cup(1,2)\cup(2,+\infty)$

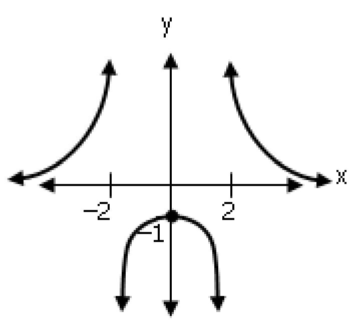
d) $(-\infty,2)\cup(2,+\infty)$

2A. State the domain and range of the given function using interval notation.



Domain =	
Range =	

2B. State the range of the given function.



a) $(-\infty, 0) \cup (0, \infty)$

b) $(-\infty, -1] \cup (0, \infty)$

c) $(-\infty, \infty)$

d) $(-\infty, -2) \cup (2, \infty)$

3A. Find the domain, using interval notation.

i. $g(x) = \dfrac{\sqrt{x}}{x^2 - 4}$

ii. $g(x) = \dfrac{1}{\sqrt{x - 5}}$

3B. Find the domain of the function.

$h(x) = \dfrac{x - 4}{x^3 - 16x}$

a) $(-\infty, 4) \cup (4, +\infty)$

b) $(-\infty, 0) \cup (0, +\infty)$

c) $(-\infty, +\infty)$

d) $(-\infty, -4) \cup (-4, 0) \cup (0, 4) \cup (4, +\infty)$

4A. Let $f(x) = x^2$ and $g(x) = \sqrt{x+2}$, find $(f \circ g)(x)$ and state the domain using interval notation.

4B. Let $f(x) = \sqrt{x}$ and $g(x) = \dfrac{1}{x}$. State the domain of $(g \circ f)(x)$.

a) $(-\infty, 0) \cup (0, +\infty)$

b) $(0, +\infty)$

c) $[0, +\infty)$

d) $(-\infty, +\infty)$

5A. Find the exact value of:

$$\cos\left(\sin^{-1}\frac{\sqrt{2}}{3}\right)$$

5B. Find the exact value of:

$$\sin\left(\tan^{-1}\frac{7}{3}\right)$$

a) $\frac{7}{3}$

b) $\frac{3}{7}$

c) $\frac{7\sqrt{58}}{58}$

d) $\frac{3\sqrt{58}}{58}$

6A. Determine algebraically whether the function is even, odd, or neither.

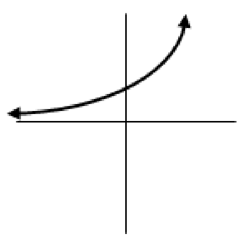
$f(x) = 5x^3 - 9$

6B. Which of the following are odd functions?

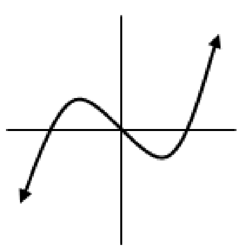
I. $g(x) = x^3 + x$

II. $f(x) = x^4 - 3x^2 + 7$

III.



IV.



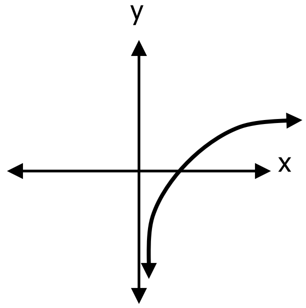
a) I only

b) II and III

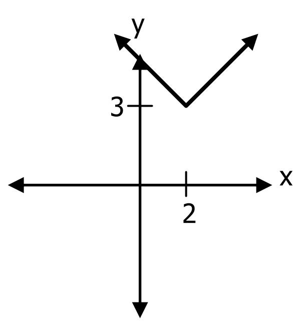
c) I and IV

d) IV only

7A. If $y = \log_2 x$ has its graph as shown, sketch the graph $y = \log_2(x+3)+1$.



7B. Find the equation that represents the following graph. Assume no vertical stretch or compression.



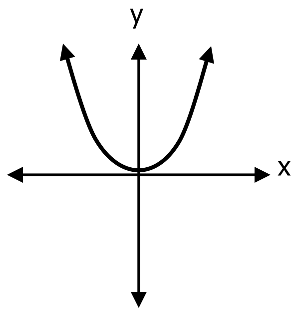
a) $y = |x+2|+3$

b) $y = |x+2|-3$

c) $y = |x-2|+3$

d) $y = |x-2|-3$

8A. If $y = x^2$ has its graph as shown, sketch the graph $y = 2(x-3)^2 - 1$.



8B. Which of the following is an equation for the graph produced as a result of applying the following three transformations in the given order to the graph of $y = \sqrt{x}$?

1. A reflection over the x-axis.
2. A horizontal shift 3 units to the left.
3. A vertical shift 2 units down.

a) $y = -\sqrt{x-3} - 2$

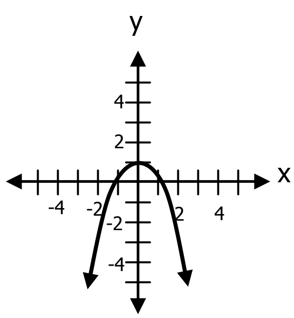
b) $y = -3\sqrt{x} - 2$

c) $y = -\sqrt{x+3} - 2$

d) $y = -\sqrt{x+3} + 2$

9A. Sketch a possible graph of $p(x) = x^3 + bx^2 + cx + d$

9B. Match the correct function to the graph.



a) $y = -2x^2$

b) $y = -2x^2 + 1$

c) $y = -2x^2 - 1$

d) $y = 1 - x^2$

10A. Find all asymptotes and any intercepts for the function:

$$f(x) = \frac{2x^2 - 5x - 3}{x^2 - 2x - 8}$$

10B. Find the horizontal asymptote of $f(x) = \frac{3x+1}{x-2}$.

a) $y = \frac{1}{3}$

b) $y = 3$

c) $y = 2$

d) $y = \frac{-1}{3}$

11A. Find all asymptotes for $f\left(x\right)=\dfrac{x+2}{x^2-3x-10}$

11B. Find the vertical asymptote(s) for $g\left(x\right)=\dfrac{x+3}{x^2+2x-8}$

a) $x=-3$

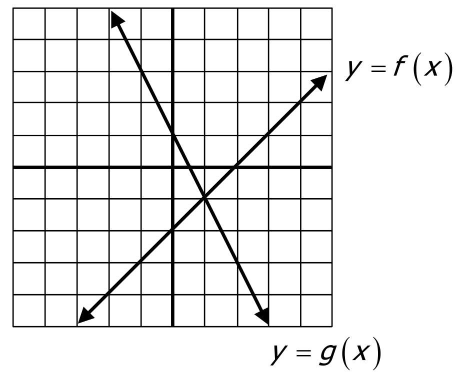
b) $x=4, x=-3$

c) $x=0$

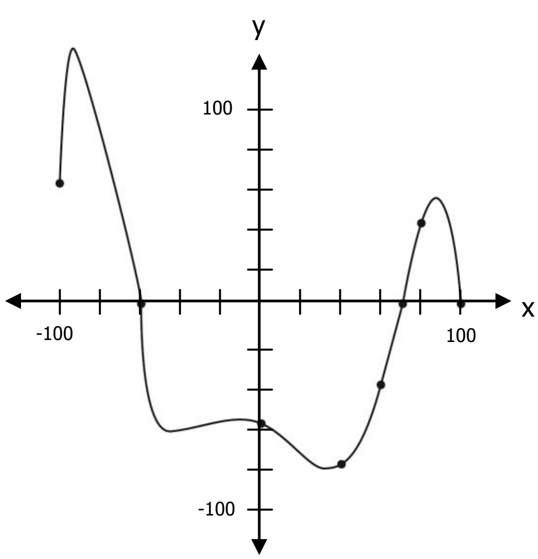
d) $x=2, x=-4$

12A. Solve the inequality: $f(x) < g(x)$

Write the solution using interval notation.



12B. If $y = f(x)$ has its graph as shown, for what numbers x is $f(x) > 0$?



a) $(-60, 70)$

b) $[-100, -60) \cup (70, 100)$

c) $(-\infty, -60)$

d) $(-60, \infty)$

13A. Solve the equation for x: $16^{3x} = 4$

13B. Solve the equation for x: $16^{3x} = 7$

a) $x = \frac{1}{3}\log\frac{7}{16}$

b) $x = \frac{7}{3\log 16}$

c) $x = \frac{\log 7}{3\log 16}$

d) $x = \frac{3\log 7}{\log 16}$

14A. Solve the equation for x:

$$\log_3(x-1)+\log_3(x+1)=2$$

14B. Solve the equation for x:

$$\log_4(x+1)-\log_4 x=1$$

a) $\frac{1}{3}$

b) $\frac{-1+\sqrt{5}}{2}$

c) 4

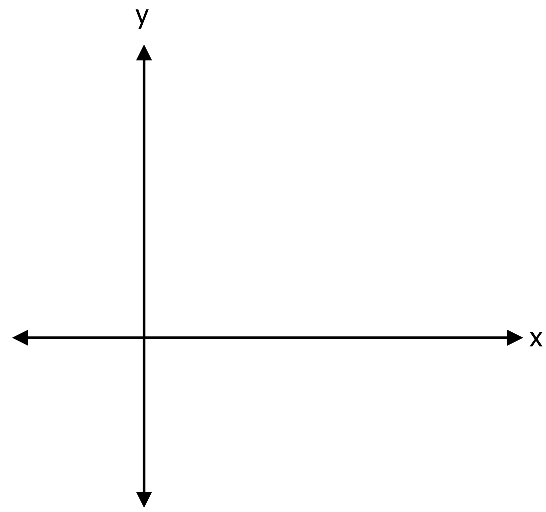
d) 1

15A. Graph one cycle of $y = \frac{1}{2}\cos\left(\frac{x}{2} + \frac{\pi}{3}\right)$

i. Determine the period.

ii. Determine the phase shift.

iii. Determine the amplitude.



15B. Find (i) the amplitude, (ii) the period, and (iii) the phase shift.

$y = -\frac{1}{2}\sin\left(4x + 3\pi\right)$

a) (i) $\frac{1}{2}$ (ii) 4 (iii) $-\frac{3\pi}{4}$

b) (i) $-\frac{1}{2}$ (ii) 4 (iii) $-\frac{4\pi}{3}$

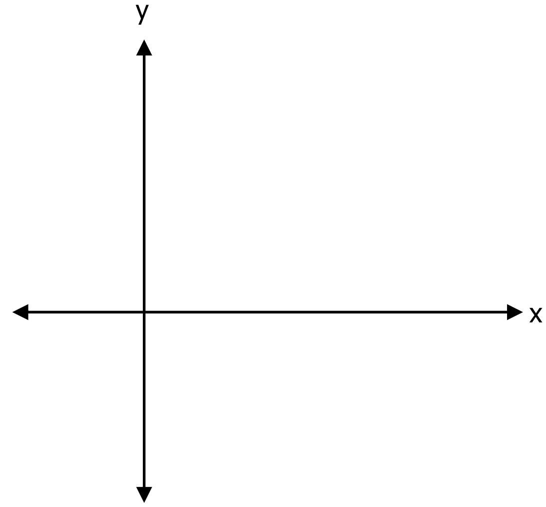
c) (i) $\frac{1}{2}$ (ii) $\frac{\pi}{2}$ (iii) $-\frac{3\pi}{4}$

d) (i) 2 (ii) $\frac{\pi}{2}$ (iii) 3π

16A. Graph one cycle of $y = \csc(4x - \pi)$.

i. Determine the period.

ii. State the domain.



16B. State the domain for $y = \frac{1}{2}\sec(4x)$.

a) $x \neq \frac{\pi}{8} + k \cdot \frac{\pi}{4}$

b) $x \neq \frac{\pi}{8} + k \cdot \frac{\pi}{2}$

c) $x \neq k \cdot \frac{\pi}{4}$

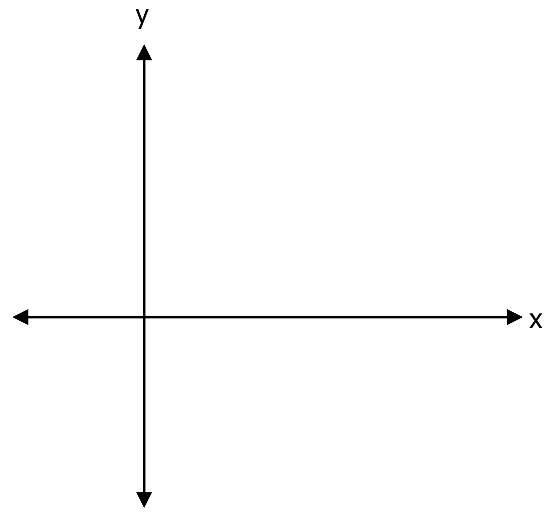
d) $x \neq k \cdot \frac{\pi}{2}$

17A. Graph one cycle of $y = 1 - 2\sin\left(\frac{\pi x}{6}\right)$.

i. Determine the period.

ii. Determine the phase shift.

iii. Determine the amplitude.



17B. Find the phase shift for $y = 3 + \frac{1}{2}\cos\left(3x + \frac{\pi}{2}\right)$.

a) $\frac{\pi}{2}$

b) $\frac{-\pi}{2}$

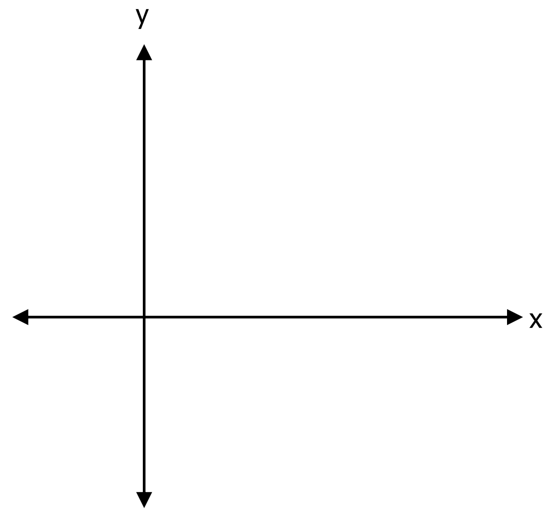
c) $-\frac{\pi}{6}$

d) $\frac{2\pi}{3}$

18A. Graph two cycles of $y = \tan\left(\frac{x}{3}\right)$.

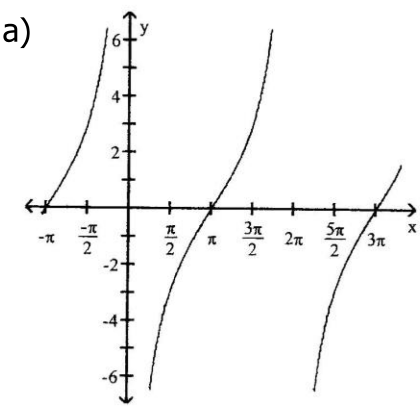
i. Determine the period.

ii. Determine the domain.

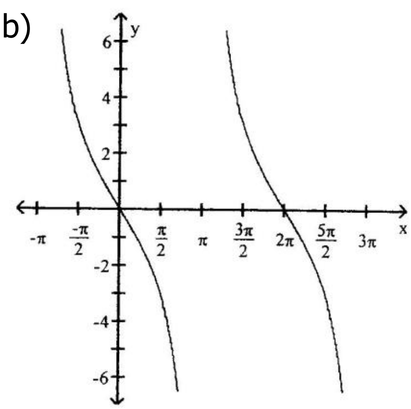


18B. Match the correct graph with $y = -3\cot(2x)$

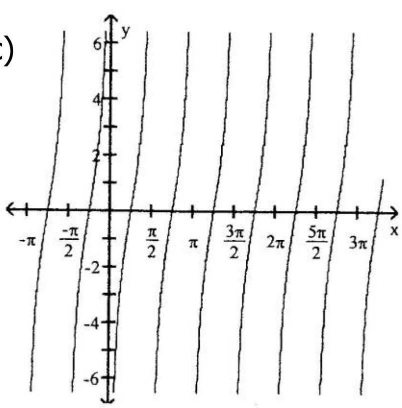
a)



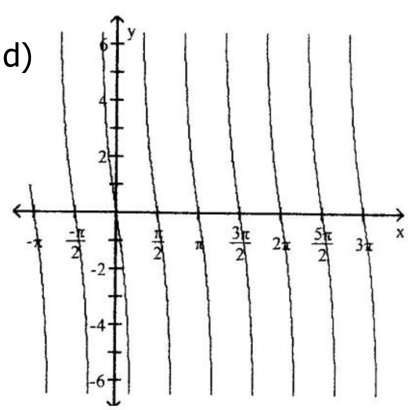
b)



c)



d)



19A. Establish the identity.

$$\cos^4 \theta - \sin^4 \theta = \cos(2\theta)$$

19B. Which of the following expressions is identical to $\dfrac{\cos 2\theta}{\sin\theta\cos\theta}$?

a) $\cot\theta - \tan\theta$

b) $\cos\theta - \sin\theta$

c) $2\cos\theta$

d) $\dfrac{2\cos\theta - 1}{\sin\theta}$

20A. Given: $\sin A = \dfrac{3}{5}$, $0 < A < \dfrac{\pi}{2}$ and $\cos B = -\dfrac{1}{4}$, $\dfrac{\pi}{2} < B < \pi$,
find $\cos\left(A + B\right)$.

20B. Given $\tan A = \dfrac{3}{4}$, $0 < A < \dfrac{\pi}{2}$ and $\cos B = \dfrac{-2}{5}$, $\dfrac{\pi}{2} < B < \pi$,
find $\sin\left(A - B\right)$.

a) $\dfrac{-6 - 4\sqrt{21}}{25}$

b) $\dfrac{6 - 4\sqrt{21}}{25}$

c) $\dfrac{-6 + 4\sqrt{21}}{25}$

d) $\dfrac{6 + 4\sqrt{21}}{25}$

21A. Solve on the interval $0 \le x < 2\pi$.

$\sec x = -\sqrt{2}$

21B. Solve the equation on the interval $0 \le \theta < 2\pi$

$2\sin^2 \theta - 3\sin\theta - 2 = 0$

a) $\frac{7\pi}{6}, \frac{11\pi}{6}$

b) $\frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}$

c) $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$

d) $\frac{4\pi}{3}, \frac{5\pi}{3}$

22A. Solve the equation on the interval $0 \le x < 2\pi$.

$$\tan x - \cos x \tan x = 0$$

22B. Solve the equation on the interval $0 \le x < 2\pi$.

$$2\sin^2 x + \sin x - 3 = 0$$

a) $x = \frac{\pi}{2}$

b) $x = \frac{3\pi}{2}$

c) $x = \frac{\pi}{2}; \frac{4\pi}{3}; \frac{5\pi}{3}$

d) $x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{3\pi}{2}$

23A. Give a general formula for all radian solutions.

$$\cos\frac{x}{2} = \frac{\sqrt{2}}{2}$$

23B. Give a general formula for all solutions of: $\sin(2x) = \frac{1}{2}$.

a) $x = \frac{\pi}{12} + k\bullet 2\pi, x = \frac{5\pi}{12} + k\bullet 2\pi$

b) $x = \frac{\pi}{6} + k\bullet 2\pi, x = \frac{\pi}{3} + k\bullet 2\pi$

c) $x = \frac{\pi}{6} + k\bullet \pi, x = \frac{\pi}{3} + k\bullet \pi$

d) $x = \frac{\pi}{12} + k\bullet \pi, x = \frac{5\pi}{12} + k\bullet \pi$

24A. Solve the equation on the interval $0 \le x < 2\pi$.

$$\sin 2x \sin x = \cos x$$

24B. Solve the equation on the interval $0 \le \theta < 2\pi$

$$\cos(2\theta) + 6\sin^2\theta = 2$$

a) $\frac{\pi}{3}, \frac{5\pi}{3}$

b) $\frac{\pi}{6}, \frac{5\pi}{6}$

c) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

d) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

25A. Use a half-angle formula to find the exact value of $\cos\left(\frac{-\pi}{8}\right)$.

25B. Given $\cos\theta = \frac{3}{4}$ and $0 \le \theta < \frac{\pi}{2}$, find $\sin\frac{\theta}{2}$.

a) $\frac{1}{4}$

b) $\frac{\sqrt{2}}{4}$

c) $\frac{\sqrt{2}}{2}$

d) $\frac{-1}{4}$

Part II – Calculator Section

26A. If $f(x) = 5x - 7$, find $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$.

26B. If $f(x) = x^2 - 1$, find $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$.

a) $2h$

b) 2

c) $2x + h$

d) 1

27A. The following table lists per capita income.

Year	Income (per capita)
1970	$4,072
1980	$10,029
1990	$19,142
1998	$26,412

i. Use regression analysis to find a line of best fit to the data.
Use $x = 0$ to represent the year 1970. Round to the nearest hundredth.

ii. Predict the income in 2004. Round according to the table.

27B. Use regression analysis to find a quadratic function that models the data.
An engineer collects data showing the speed s of a given car model and its average miles per gallon M.

Speed, s	mpg, M
20	18
30	20
40	23
50	25
60	28
70	24
80	22

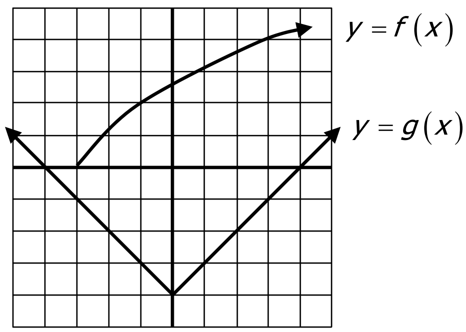
a) $M(s) = -0.631x^2 + 0.720x + 5.143$

b) $M(s) = -6.309x^2 + 0.720x + 5.143$

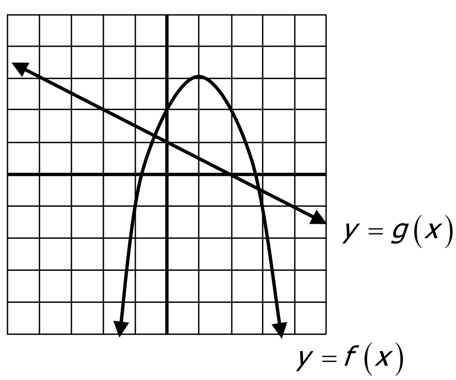
c) $M(s) = -0.063x^2 + 0.720x + 5.143$

d) $M(s) = -0.0063x^2 + 0.720x + 5.143$

28A. Use the graph to evaluate $(f \cdot g)(3)$.



28B. Use the graph to evaluate $(f + g)(0)$.



a) 1

b) 2

c) 3

d) 4

29A. If $f(x)=\sqrt{x+2}$ and $g(x)=x^2$, find $(f\circ g)(-2)$.

29B. Find $(g\circ f)(1)$ if $f(x)=\sqrt{5-x}$ and $g(x)=x^2+x$.

a) 2

b) 6

c) 4

d) 8

30A. Given $f(x) = x^3 - 4x^2 - 3x + 15$, to the nearest hundredths:

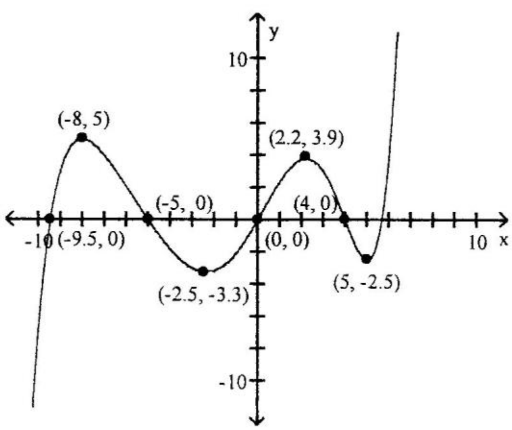
i. Find where $f(x)$ is increasing

ii. Find where $f(x)$ is decreasing

iii. Find the coordinate(s) of any relative maximum

iv. Find the coordinate(s) of any relative minimum

30B. The graph of a function f is given. Which of the following is a true statement about the graph?



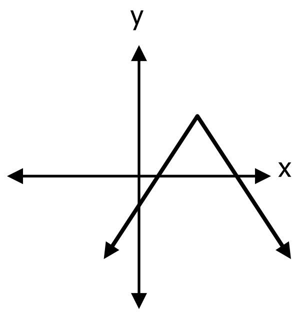
a) f has a local minimum at x=-2.5 and 5; the local minimum at -2.5 is -3.3; the local minimum at 5 is -2.5

b) f has a local maximum at x=-3.3 and -2.5; the local maximum at -3.3 is -2.5; the local maximum at -2.5 is 5

c) f has a local maximum at x=-2.5 and 5; the local maximum at -2.5 is -3.3; the local maximum at 5 is -2.5

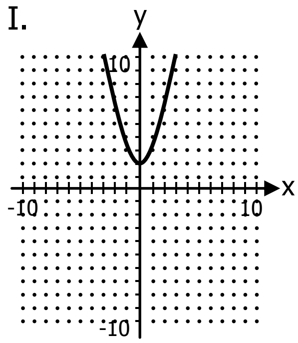
d) f has a local minimum at x=-3.3 and -2.5; the local minimum at -3.3 is -2.5; the local minimum at -2.5 is 5

31A. Is the following function one-to-one?

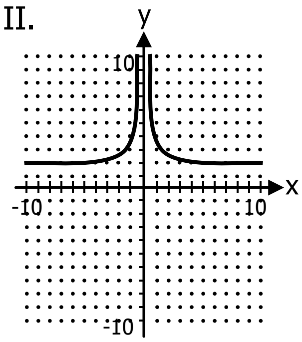


31B. Determine which of the following functions are one-to-one?

I.



II.



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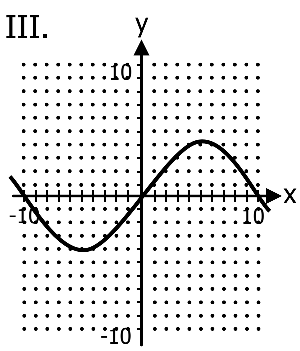
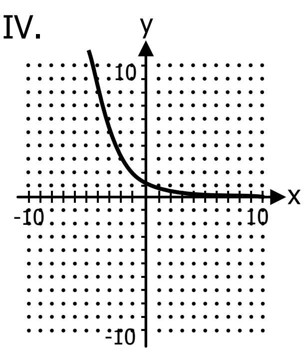


IV.



a) II and IV only

b) I, II and IV only

c) I and IV only

d) IV only

32A. Find $f^{-1}(x)$ given $f(x) = x^3 + 2$.

32B. Find $g^{-1}(x)$ given $g(x) = \frac{2x-1}{x+1}$.

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

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

c) $g^{-1}(x) = \frac{x-1}{2-x}$

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

33A. Jack wants to use 300 feet of fencing to enclose three sides of a rectangular plot of land using an existing wall for the fourth side. Find the dimensions of the rectangle with maximum enclosed area. What is the maximum area?

33B. You have 144 feet of fencing to enclose a rectangular region. Find the function that models the area of the rectangular region.

a) $A(x) = x(72 - x)$

b) $A(x) = x(144 - 2x)$

c) $A(x) = x(72 - 2x)$

d) $A(x) = x(144 - x)$

34A. How many real zeros and non-real zeros does $f\left(x\right) = 1 - 2x + 3x^2 - 4x^4$ have?

34B. How many real zeros does $g\left(x\right) = 3x^5 + 2x^3 - x^2 + 4x + 4$ have?

a) none

b) 1

c) 3

d) 5

35A. Find the exact value of the zeros for: $f(x) = x^4 - 3x^3 + 6x^2 + 2x - 60$.

35B. List the potential rational zeros for $f(x) = 2x^3 + 3x^2 - 11x + 6$.

a) $\pm\left\{\frac{1}{2}, \frac{3}{2}, 1, 2, 3, 6\right\}$

b) $\pm\left\{\frac{1}{2}, 2, 1, 6\right\}$

c) $\pm\left\{\frac{3}{2}, 2, 3, 6\right\}$

d) $\pm\left\{\frac{1}{2}, \frac{3}{2}, 1, 6\right\}$

36A. Find a polynomial function, with real coefficients, that has a degree of 3 and zeros 1 and 1-*i*.

36B. Which one of the following is a polynomial function of degree 3, that has -2 and 3+*i* as zeros?

a) $f(x) = (x+2)(x-3-i)$

b) $f(x) = (x-2)(x-3-i)$

c) $f(x) = (x+2)(x^2+6x+10)$

d) $f(x) = (x+2)(x^2-6x+10)$

37A. Suppose that (-1,4) is on a graph. If the graph is symmetric with respect to the y-axis, name another point on the graph.

37B. Suppose that (-2,-1) is on a graph. If the graph is symmetric with respect to the x-axis, which of the following is also on the graph?

a) (2,1)

b) (-2,1)

c) (2,-1)

d) (-1,-2)

38A. Find the vertex, the focus, and the directrix of the parabola with equation $x^2 - 4x - 16y - 12 = 0$.

38B. Find the focus of the parabola with equation $(y+2)^2 = -8(x-4)$.

a) (6,-2)

b) (4,0)

c) (2,-2)

d) (4,-4)

39A. Find the domain of the function using interval notation.

i. $f(x) = \log(x-1)$

ii. $f(x) = e^{x}$

39B. Find the domain of the function $f(x) = \ln(5-x)$.

a) $(-\infty, -5)$

b) $(-5, \infty)$

c) $(5, \infty)$

d) $(-\infty, 5)$

40A. Evaluate $\log_2 37$ to four decimal places.

40B. Evaluate $\log_3 \left(\frac{2}{5}\right)$.

a) 0.9027

b) -0.3979

c) -0.8340

d) -1.1990

41A. Write the expression as a sum and/or difference of logarithms.
Express powers as factors.

$$\log_a \frac{x^3 y^{3/2}}{\sqrt{z}}$$

41B. Write the expression as a sum and/or difference of logarithms.
Express powers as factors.

$$\log_b \frac{x^5 y^7}{z+1}$$

a) $5\log_b x - \log_b x^7 - \log_b (z+1)$

b) $5\log_b x + 7\log_b y - \log_b (z+1)$

c) $\log_b x^5 y^7 - \log_b (z+1)$

d) $5\log_b x - \log_b \frac{y^7}{z+1}$

42A. A bacterial culture has an initial population of 10,000. If its population declines to 4000 in 4 hours, what will it be at the end of 6 hours? Assume that the population decreases according to the exponential law. Round to the nearest whole number.

42B. An endangered species of fish has a population that is decreasing according to the exponential law. The population 8 years ago was 1600. Today, only 900 of the fish are alive. Once the population drops below 100, the situation will be irreversible. When will this happen?

a) 33 years from today

b) 31 years from today

c) 39 years from today

d) 32 years from today

43A. If $3,175 is invested at 4.3% compounded continuously, what will the amount be after 5 years?

43B. If $2,250 is invested at 7% compounded monthly, what will the amount be after 6 years?

a) $3,420.24

b) $293,639.52

c) $2,329.91

d) $133,352.36

44A. If θ is in standard position and $\cos\theta < 0$ and $\tan\theta < 0$, in what quadrant does the terminal side of θ lie?

44B. If θ is in standard position and $\sin\theta = -0.3$ and $\cos\theta < 0$, in what quadrant does the termial side of θ lie?

a) Quadrant II

b) Quadrant IV

c) Quadrant I

d) Quadrant III

45A. Let θ be an angle in standard position with the point $(2,-5)$ on the terminal side of θ. Find the exact value of the six trigonometric functions.

45B. Let θ be an angle in standard position with the point $\left(\frac{3}{4},\frac{\sqrt{7}}{4}\right)$ on the terminal side of θ. Find $\tan\theta$.

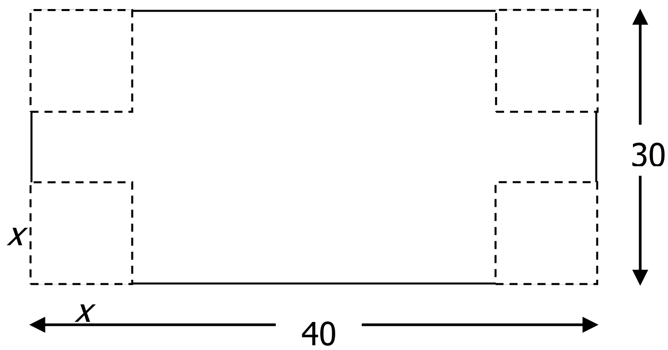
a) $\frac{4}{3}$

b) $\frac{3\sqrt{7}}{7}$

c) $\frac{\sqrt{7}}{4}$

d) $\frac{\sqrt{7}}{3}$

46A. A box with no lid is made from a rectangular sheet of cardboard 30 inches by 40 inches by removing squares from each corner and turning up the sides. Let x be the length of the side of the removed squares. Round to the nearest hundredths.

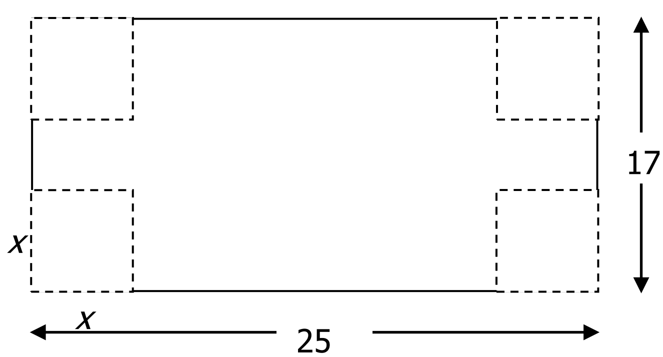


i. Write a model that gives the volume of the box as a function of x.

ii. The maximum volume occurs when x= __________.

iii. The maximum volume of the box is _____________.

46B. A box with an open top is to be made by cutting equal squares from the four corners of a 17 cm by 25 cm piece of cardboard. Let x be the length of the side of the removed squares. Determine the length of the square that must be cut out to produce a box with a maximum volume.



a) x= 4.75 cm

b) x= 6.63 cm

c) x= 3.83 cm

d) x= 3.31 cm

47A. A straight trail with an angle of elevation of 17° leads from a hotel at an elevation of 9,000 feet to a mountain lake at an elevation of 11,200 feet. What is the length of the trail? Round to the nearest tenth.

47B. A 125 foot line is attached to a kite. When the kite has pulled the line taut, the angle of elevation to the kite is 58°. At what height above the ground is the kite flying?

a) 53 ft

b) 106 ft

c) 66 ft

d) 85 ft

48A. A bicycle of diameter 28 inches is rolled through an angle of 840°. How far has the wheel moved? Round to the nearest tenth.

48B. The minute hand of a clock is 3 inches long. How far does the tip of the minute hand move in 10 minutes?

a) 4.37 in.

b) 5.65 in.

c) 3.14 in.

d) 1.4 in.

49A. Identify the type of conic section.

i. $x^2 + 2x + 4y = 0$

ii. $4x^2 - 3y^2 + 2y + 7 = 0$

iii. $5x^2 + 3x + 5y^2 - 2y = 3$

iv. $6x^2 + 3x + 4y^2 + 5 = 0$

49B. The equation $4x^2 - 5x + 8y^2 - 2y = 10$ represents a:

a) Circle

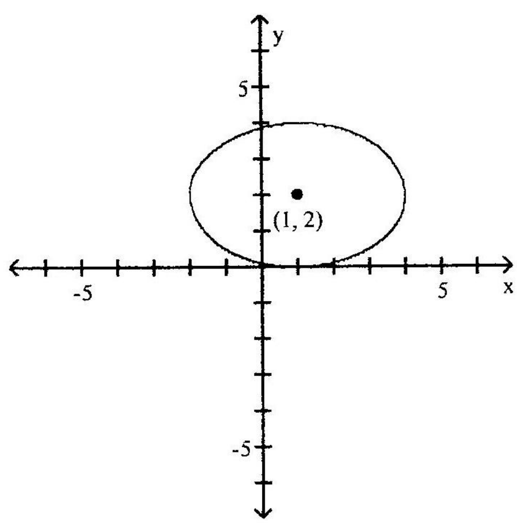
b) Hyperbola

c) Parabola

d) Ellipse

50A. Find the foci, the center, the vertices, and the asymptotes for the hyperbola with equation $x^2 - 2y^2 + 2x + 8y - 5 = 0$.

50B. Write an equation for the graph.



a) $\frac{(x-2)^2}{9} + \frac{(y-1)^2}{4} = 1$

b) $\frac{(x-1)^2}{9} + \frac{(y-2)^2}{4} = 1$

c) $\frac{(x-1)^2}{4} + \frac{(y-2)^2}{9} = 1$

d) $\frac{(x+1)^2}{9} + \frac{(y+2)^2}{4} = 1$

Answer Key:

1. A. D= $[-5, +\infty)$

R= $[0, +\infty)$

B. d.

2. A. D= $(-\infty, +\infty)$

R= $[-4, +\infty)$

B. b.

3. A. i. $[0, 2) \cup (2, +\infty)$

ii. $(5, +\infty)$

B d.

4. A. $(f \circ g)(x) = x + 2$ and $D = [-2, +\infty)$

B. b.

5. A. $\frac{\sqrt{7}}{3}$

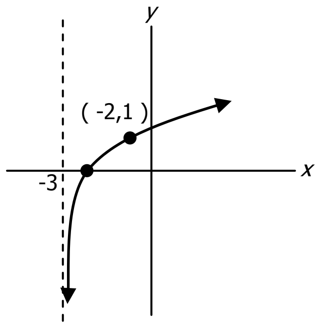
B. c.

Answer Key:

6. A. Neither

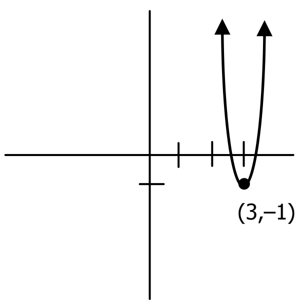
B. c.

7. A.



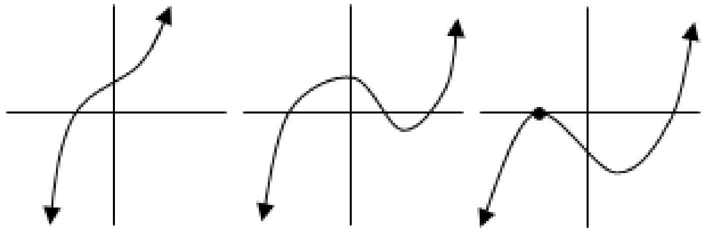
B. c.

8. A.



B. c.

9. A. NOTE: All possibilities have end behavior in QI and QIII.



B. d.

Answer Key:

10. A. VA: $x = -2, x = 4$
HA: $y = 2$
OA: none
x-int: $\left(\frac{-1}{2}, 0\right), (3, 0)$
y=int: $\left(0, \frac{3}{8}\right)$

B. b.

11. A. VA: x=5
HA: y=0
OA: none

B. d.

12. A. $(-\infty, 1)$

B. b.

13. A. $x = \frac{1}{6}$

B. c.

14. A. $x = \sqrt{10}$

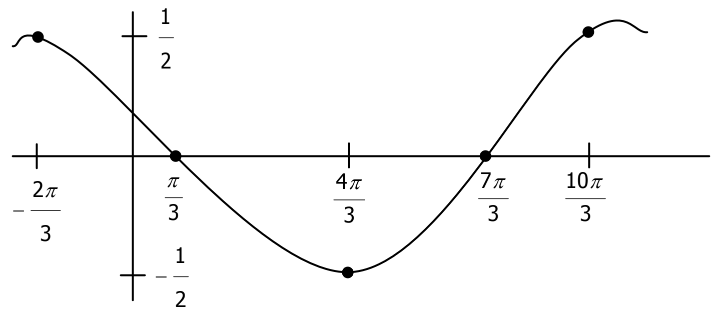
B. a.

Answer Key:

15. A. i. 4π

ii. $-\frac{2\pi}{3}$

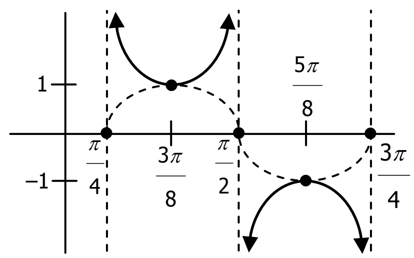
iii. $\frac{1}{2}$



B. c.

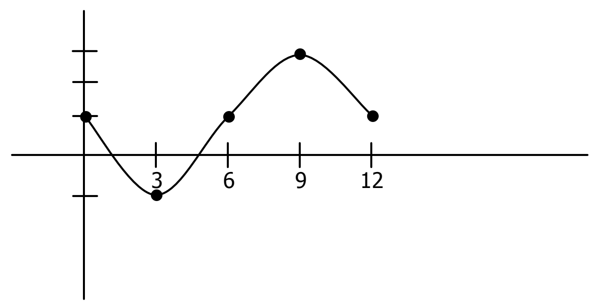
16. A. i. $\frac{\pi}{2}$

ii. $x \neq K \bullet \frac{\pi}{4}$



B. a.

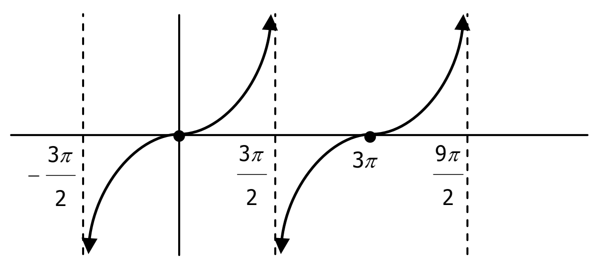
17. A. i. 12
ii. 0
iii. 2



B. c.

18. A. i. 3π

ii. $x \neq \frac{3\pi}{2} + K \bullet 3\pi$



B. c.

19. A. Proofs will vary

B. a.

Answer Key:

20. A. $\dfrac{-4-3\sqrt{15}}{20}$

B. a.

21. A. $x=\dfrac{3\pi}{4}, x=\dfrac{5\pi}{4}$

B. a.

22. A. $x=0,\ x=\pi$

B. a.

23. A. $x=\dfrac{\pi}{2}+k\bullet 4\pi, x=\dfrac{7\pi}{2}+k\bullet 4\pi$

B. d.

24. A. $x=\dfrac{\pi}{4},\dfrac{\pi}{2},\dfrac{3\pi}{4},\dfrac{5\pi}{4},\dfrac{3\pi}{2},\dfrac{7\pi}{4}$

B. c.

25. A. $\dfrac{\sqrt{2+\sqrt{2}}}{2}$

B. b

26. A. 5

B. c.

Answer Key:

27. A. $y = 807.38x + 3206.77$

$\$30,658$

B. d.

28. A. -4

B. c.

29. A. $\sqrt{6}$

B. b.

30. A. i. $(-\infty, -0.33) \cup (3, +\infty)$

ii. $(-0.33, 3)$

iii. $(-0.33, 15.52)$

iv. $(3, -3)$

B. a.

31. A. No

B. d.

32. A. $f^{-1}(x) = \sqrt[3]{x-2}$

B. d.

33. A. width = 75 ft

length = 150 ft

area = 11,250 sq ft

B. a.

Answer Key:

34. A. 2 real
2 non-real

B. b.

35. A. $x = 3$, $x = -2$, $x = 1 \pm 3i$

B. a.

36. A. $f(x) = a\left(x^3 - 3x^2 + 4x - 2\right), a \neq 0$

B. d.

37. A. $(1, 4)$

B. b.

38. A. Vertex: $(2, -1)$

Focus: $(2, 3)$

Directrix: $y = -5$

B. c.

39. A. i.) $(1, +\infty)$
ii.) $(-\infty, +\infty)$

B. d.

40. A. 5.2095

B. c.

Answer Key:

41. A. $3\log_a x + \frac{3}{2}\log_a y - \frac{1}{2}\log_a z$

B. b.

42. A. 2530 bacteria

B. b.

43. A. $3,936.56

B. a.

44. A. QII

B. d.

45. A. $\sin\theta = -\frac{5\sqrt{29}}{29}$

$\cos\theta = \frac{2\sqrt{29}}{29}$

$\tan\theta = -\frac{5}{2}$

$\cot\theta = -\frac{2}{5}$

$\sec\theta = \frac{\sqrt{29}}{2}$

$\csc\theta = -\frac{\sqrt{29}}{5}$

B. d.

Answer Key:

46. A. i.) $v(x) = x(40 - 2x)(30 - 2x)$

ii.) $x = 5.66$ in.

iii.) 3,032.30 in.^{3}

B. d.

47. A. 7,524.7 ft.

B. b.

48. A. 205.3 in.

B. c.

49. A. i. parabola

ii. hyperbola

iii. circle

iv. ellipse

B. d.

50. A.

center:	(−1, 2)
foci:	$(-1, 2 \pm \sqrt{3})$
vertices:	(−1, 3), (−1, 1)
asymptotes:	$(y-2) = \pm\frac{\sqrt{2}}{2}(x+1)$

B. b.