Accelerated Mathematics III Study Guide
Fall 2011 District-wide Semester Exam
Henry County Schools

IN ADDITION TO THESE SAMPLE PROBLEMS, STUDENTS SHOULD REVIEW ALL PREVIOUS TEST QUESTIONS, CLASS NOTES, AND FORMATIVE ASSESSMENTS, ETC IN PREPARATION FOR THIS EXAM.

Unit 1 – Practice with Confidence Intervals of Sample Proportions

1. A recent study of 100 people in Miami found 27 were obese. Construct and interpret the 90% confidence interval of the population proportion of individuals living in Miami who are obese.

2. A survey of 50 first time white-water canoers showed that 23 did not want to repeat the experience. Construct and interpret the 99% confidence interval of the true proportion of canoers who did not wish to canoe the rapids a second time.

3. A major metropolitan newspaper selected a simple random sample of 1,600 readers from their list of 100,000 subscribers. They asked whether the paper should increase its coverage of local news. Forty percent of the sample wanted more local news. Construct and interpret the 99% confidence interval for the proportion of readers who would like more coverage of local news?

4. Experimenters injected a growth hormone gene into thousands of carp eggs. Of the 400 carp that grew from these eggs, 20 incorporated the gene into their DNA (*Science News*, May 20, 1989). Construct and interpret a 95% confidence interval for the proportion of carp that would incorporate the gene into their DNA.

A data set contains the number of wins for every Division 1 college football team at the end of the 2010 season, and the data is distributed normally. The mean number of wins is 7, and the standard deviation is 2.5.

5. What is the probability that a team won 4 games or fewer?

6. The University of Georgia had only six wins in 2010. What is the team's percentile rank in comparison to all of the other schools?

7. The Florida Gators had eight wins in 2010, while the Arkansas Razorbacks had ten wins. What percentage of schools finished with a number of wins in between Florida and Arkansas?

8. The Ohio State Buckeyes completed the season with 12 wins. What percentage of schools finished with more wins that Ohio State?

9. An athletic director tells his football coach, "You must be better than 75% of the schools this year in order to keep your job." According to last year's data, how many wins does the coach need to keep his job?

The number of hours of sleep per night that each adult male in the U.S. receives is placed in a data set. The data has a mean of 7.2 hours, and a standard deviation of 0.6 hours. In addition, the data has a normal distribution.

10. What percentage of men receive more than 8 hours of sleep per night?

11. What percentage of men receive between 6.5 and 7.5 hours of sleep each night?

12. Tom claims, "I only get 6 hours of sleep each night. No other guy can survive on that little sleep." What is the probability that a male gets 6 hours of sleep or fewer?

13. In order to be in the top 15% in regards to sleep amount, how many hours of sleep must an adult man receive?

Most **common level of confidence used is 95%.** So willing to take a 5% risk that the interval does not actually cover the true value.
- We **never know for sure** whether any one given confidence interval covers the truth. However, …
- **In long run**, 95% of all confidence intervals tagged with 95% confidence will be correct and 5% of them will be wrong.

The cure rate for standard treatment of a disease is 45%. Dr. Snyder has perfected a primitive treatment which he claims is much better. As evidence, he says that he has used his new treatment on 50 patients with the disease and cured 25 of them. What do you think? Is this new treatment better? Use a 95% confidence interval to answer the question. (Ans.: (.36,.64)).

Using Carrie's baseball data, estimate the proportion of professional baseball players who weigh 200 or more pounds. Find a 95% confidence interval for this proportion and interpret it. (Ans: 21 out of 59 weigh 200 or more pounds. So the CI is: (.23, .48)).

In a random sample of 200 British couples, the wife was taller than the husband in only 10 couples.
- **sample proportion = 10/200 = 0.05 or 5%**
- **standard deviation =**
- **confidence interval = .05 ± 2(0.015) = .05 ± .03 or 0.02 to 0.08** $\sqrt{\frac{(0.05)(1-0.05)}{200}}$ **= 0.015**

Interpretation: We are 95% confident that of all British couples, between .02 (2%) and .08 (8%) are such that the wife is taller than her husband.

Of 1500 people surveyed, 850 had eaten pizza within the last month. Construct the 95% confidence interval estimate of the population proportion of people who have eaten pizza within the last month.

In the city or area where you live, are you satisfied or dissatisfied with the quality of water?
In the United States 1000 residents aged 15 or older were surveyed and 870 replied they were satisfied with the water quality. Construct the 99% confidence interval estimate of all US residents satisfied with their water quality.

Have recent price increases in gasoline caused any financial hardship for you or your household?
In the United States 1025 residents aged 18 or older were surveyed and 646 replied "yes". Construct the 90% confidence interval estimate of all US residents who report that the price increases in gasoline have caused some financial hardship for themselves or their household.

Unit 2 Review Data Analysis - Sequences and Series

Part A: State the type of Sequence **A) Arithmetic Sequence or Geometric Sequence**.
Part B: Give the common pattern **B) Give the Common Difference or Common Ratio**.

14. 18, 26, 34, … A. _____ B. _____

15. -2, 6, -18, … A. _____ B. _____

16. 3, -6, 12, -24, … A. _____ B. _____

17. $-14, 7, -\frac{7}{2}, \ldots$ A. _____ B. _____

Find the n^{th} term for each **arithmetic sequence**.

18. $a_1 = 20, d = 4, n = 10$

19. a_{12} for 4, 7, 10, …

20. $a_1 = 2, d = 2, n = 8$

21. 3, 11, 19, 27, … n = 20

22. Find the missing terms of the following arithmetic sequence:
____, 40, ____, ____, 85, ____ 115

Find the sum of each **arithmetic series** described.

23. $a_1 = 34, n = 12, a_n = 2$

24. $a_1 = 5, d = \frac{1}{2}, n = 13$

25. -4 + -1 + 2 + …+ 53

26. $\sum_{k=3}^{10} (3k + 2)$

Find the n^{th} term of the **geometric sequence**.

27. $a_1 = 4, n = 4, r = 5$

28. $a_1 = 243, n = 5, r = -\frac{1}{3}$

29. $a_3 = 32, n = 6, r = -\frac{1}{2}$

30. 3, 9, 27, 81, ..., n =10

31. Find the missing terms in the geometric sequence: 7, _____, _____, _____, 112

Find the sum of the geometric series.

32. $a_1 = 10, r = 2, n = 10$

33. $a_1 = 343, a_4 = -1, r = -\frac{1}{7}$

34. Find a_1, given $S_n = 30, n = 4, r = -2$

Find the sum of each infinite geometric series, if it exists.

34. $\frac{1}{8} - \frac{3}{16} + \frac{9}{32} - \frac{27}{64} + \ldots$

35. $a_1 = -2, r = -\frac{1}{4}$

Arithmetic Formulas: $a_n = a_1 + (n-1)d$ $S_n = \frac{n}{2}(a_1 + a_n)$

Geometric Formulas: $a_n = a_1 r^{n-1}$ $S_n = a_1\left(\frac{1-r^n}{1-r}\right)$ Infinite Geometric: $S = \frac{a_1}{1-r}$

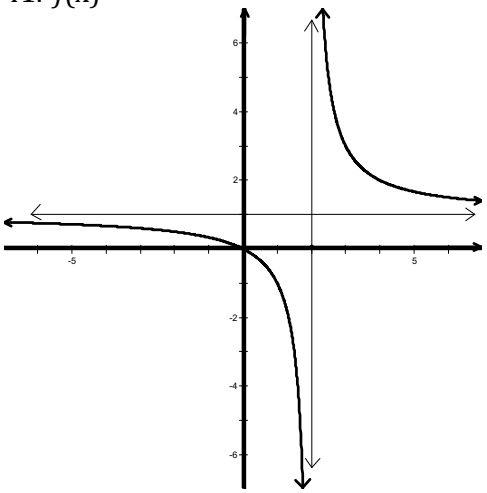
Unit 3 Review – Rational Functions
Accelerated Mathematics 3

*Fill in the chart and **graph** each function below.*

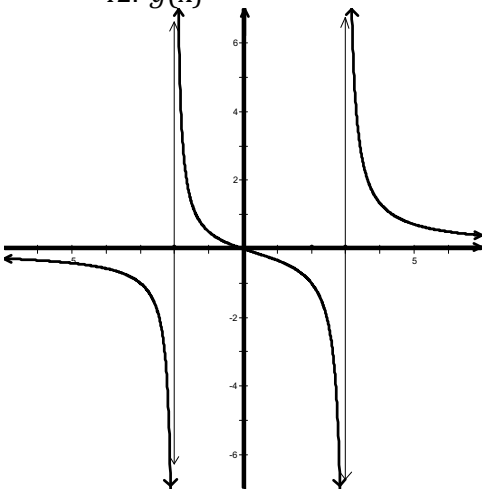
	Function	X-intercept	Y-intercept	Hole	Vertical Asymptote	Horizontal Asymptote	Slant Asymptote	Domain	Range
36.	$f(x)=\frac{x^3}{x^2-1}$								
37.	$f(x)=\frac{1-2x}{x}$								
38.	$f(x)=\frac{2x}{x^2+x-2}$								
39.	$f(x)=\frac{3\left(x^2+1\right)}{x^2+2x-15}$								
40.	$f(x)=2-\frac{3}{x^2}$								

For Questions 1-4, state the following characteristics for the rational function that is graphed on the coordinate plane: domain, range, end behavior, *x*-intercept, *y*-intercept, vertical asymptotes, horizontal asymptotes, and slant asymptotes. **Do not state the range nor the *y*-intercept for #4**.

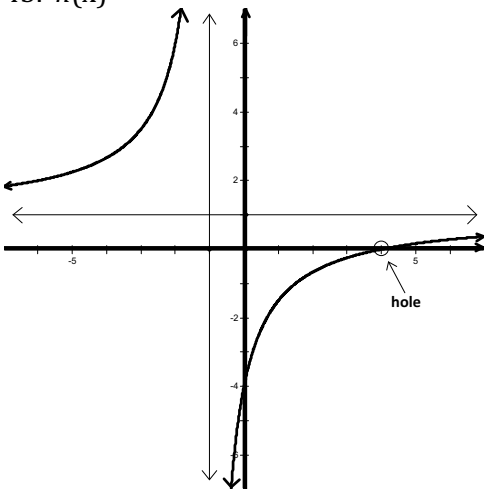
41. $f(x)$



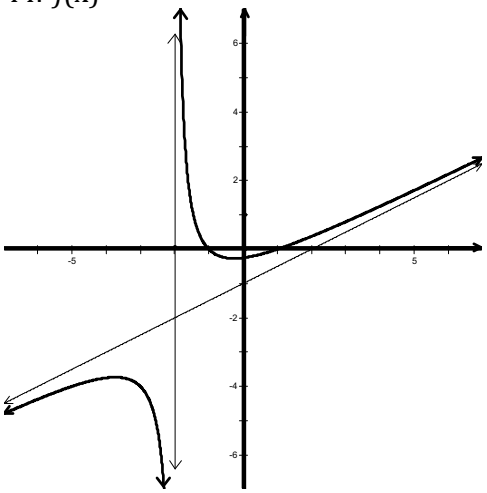
42. $g(x)$



43. $h(x)$



44. $j(x)$



For Questions 5-13, state the domain of the function with the given equation.

45. $k(x)=\dfrac{2}{x+10}$

46. $m(x)=\dfrac{4}{3x}$

47. $n(x)=\dfrac{x+5}{x^2-4x}$

48. $p(x)=\dfrac{3x^2-1}{x^2-25}$

49. $q(x)=\dfrac{5x}{2x^2+3x}$

50. $r(x)=\dfrac{x}{x^2-9x+20}$

51. $t(x)=\dfrac{5x^2-2x+1}{2x^2+25x+33}$

52. $u(x)=\dfrac{5x-1}{x^3-x^2-42x}$

53. $v(x)=\dfrac{10x-1}{2x+5}$

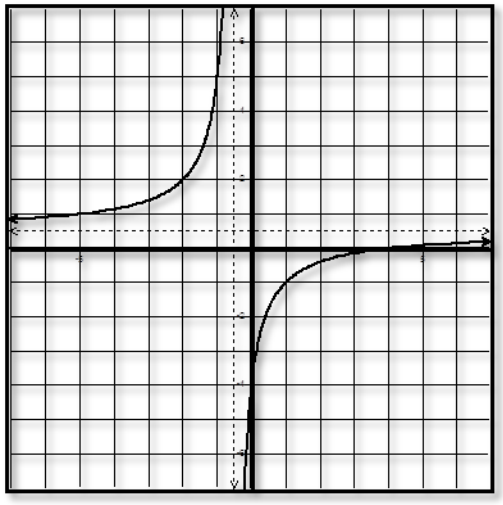
For each problem find the following: x - & y – intercept(s), vertical asymptote(s), horizontal asymptote, slant asymptote, holes, and domain.

54. $f(x)=\dfrac{x^2-1}{x}$

55. $k(x)=\dfrac{x-2}{x^2+3x-10}$

Identify the characteristics of the rational function pictured.

56.

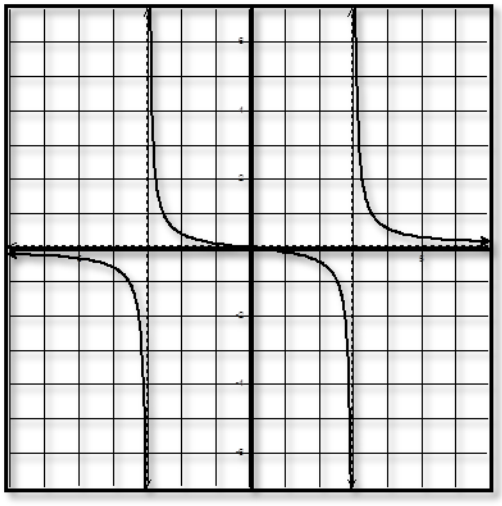


hole:

hole:

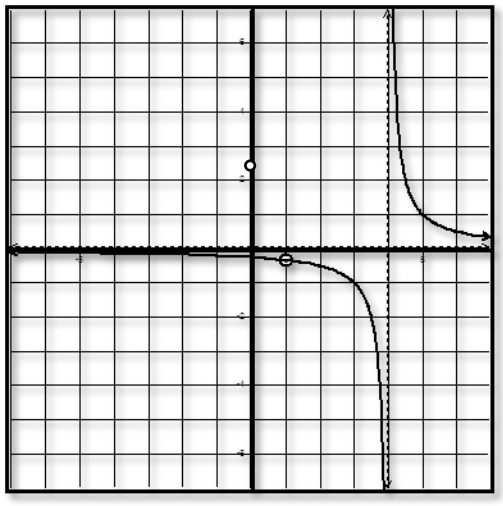
x-int:
y-int:
V.A.:
H.A.:
S.A.:
Domain:
Range:
End Behavior:

57.



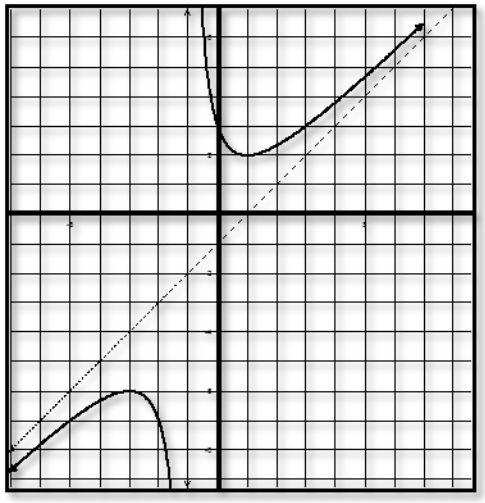
x-int:
y-int:
V.A.:
H.A.:
S.A.:
Domain:
Range:
End Behavior:

58.



hole:
x-int:
V.A.:
H.A.:
S.A.:
Domain:
Range:

59.



hole:
x-int:
V.A.:
H.A.:
S.A.:
Domain:
End Behavior:

Teacher Answer Key:

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1. We are 90% confident that the proportion of individuals living in Miami who are obese is between 0.197 and 0.343.
2. We are 99% confident that proportion of canoers who did not wish to canoe the rapids a second time is between 0.2784 and 0.6416.
3. We are 99% confident that the proportion of readers who would like more coverage of local news is between 0.3685 and 0.4315.
4. We are 95% confident that the proportion of carp that would incorporate the gene into their DNA is between 0.0286 and 0.0714.

5. .1151
6. 34.46%
7. 22.95%
8. 2.28%
9. about 9 wins (8.68 rounded up)
10. 9.18%
11. 57.05%
12. .0228
13. approximately 7.8 hours of sleep

41. D: $(-\infty,2)\cup(2,\infty)$ R: $(-\infty,1)\cup(1,\infty)$ EB: $x\to-\infty, f(x)\to1$; $x\to\infty, f(x)\to1$
x-int: $(0,0)$ y-int: $(0,0)$ V.A.: $x=2$ H.A.: $y=1$

42. D: $(-\infty,-2)\cup(-2,3)\cup(3,\infty)$ R: $(-\infty,\infty)$ EB: $x\to-\infty, g(x)\to0$; $x\to\infty, g(x)\to0$
x-int: $(0,0)$ y-int: $(0,0)$ V.A.: $x=-2$ and $x=3$ H.A.: $y=0$

43. D: $(-\infty,-1)\cup(-1,4)\cup(4,\infty)$ R: $(-\infty,0)\cup(0,1)\cup(1,\infty)$
EB: $x\to-\infty, h(x)\to1$; $x\to\infty, h(x)\to1$
x-int: None y-int: $(0,-4)$ V.A.: $x=-1$ H.A.: $y=1$

44. D: $(-\infty,-2)\cup(-2,\infty)$ EB: $x\to-\infty, j(x)\to-\infty$; $x\to\infty, j(x)\to\infty$
x-int: $(-1,0)$ and $(1,0)$ V.A.: $x=-2$ S.A.: $y=\frac{1}{2}x-1$

45. D: $(-\infty,-10)\cup(-10,\infty)$

46. D: $(-\infty,0)\cup(0,\infty)$

47. D: $(-\infty,0)\cup(0,4)\cup(4,\infty)$

48. D: $(-\infty,-5)\cup(-5,5)\cup(5,\infty)$

49. D: $(-\infty,-1.5)\cup(-1.5,0)\cup(0,\infty)$

50. D: $(-\infty,4)\cup(4,5)\cup(5,\infty)$

51. D: $(-\infty,-11)\cup(-11,-1.5)\cup(-1.5,\infty)$

52. D: $(-\infty,-6)\cup(-6,0)\cup(0,7)\cup(7,\infty)$

53. D: $(-\infty,-2.5)\cup(-2.5,\infty)$

	x-intercept	y-intercept	V.A.	Hole	H.A.	S.A.	Domain
54.	(-1,0), (1,0)	None	x = 0	None	None	y = x	$(-\infty,0)\cup(0,\infty)$
55	None	(0,1/5)	x = -5	x = 2	y = 0	None	$(-\infty,-5)\cup(-5,2)\cup(2,\infty)$

	56.	57.	58.	59.
Hole:	None	None	x = 1	None
X-intercept:	(4,0)	(0,0)	None	None
Y-intercept:	(0,4)	(0,0)	-------	-------
V.A.:	x = $-1/2$	x = -3 & x = 3	x = 4	x = -1
H.A.:	y = $1/2$	y=0	y = 0	None
S.A.:	None	None	None	y = x-1
Domain:	$(-\infty,-1/2)\cup(-1/2,\infty)$	$(-\infty,-3)\cup(-3,3)\cup(3,\infty)$	$(-\infty,1)\cup(1,4)\cup(4,\infty)$	$(-\infty,-1)\cup(-1,\infty)$
Range:	$(-\infty,1/2)\cup(1/2,\infty)$	$(-\infty,\infty)$	$(-\infty,0)\cup(0,\infty)$	$(-\infty,0)\cup(0,1)\cup(1,\infty)$
End Behavior:	$x\to-\infty, f(x)\to1/2$ $x\to\infty, f(x)\to1/2$	$x\to-\infty, f(x)\to0$ $x\to\infty, f(x)\to0$	$x\to-\infty, f(x)\to0$ $x\to\infty, f(x)\to0$	$x\to-\infty, f(x)\to-\infty$ $x\to\infty, f(x)\to\infty$