



KING SCHOOL

Summer Assignment

MAT 500: AP Calculus AB

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Directions/expectations

- Place answers on the answer sheet provided.
- Complete all problems.
- Show neat and organized work for all problems in the space provided in the packet, including multiple choice. This is required. You must provide algebraic solutions even if you use a calculator to check your answer.
- When a graph is requested, or part of your solution, provide a neatly drawn graph with appropriate labels. (This means a scale shown on the axes and axis labels.)
- On the first day of school, be prepared to submit the entire packet. It should be stapled with your name written on it.

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ANSWER SHEET: Record answers here. Show work in packet.

Multiple choice:

1.		2.		3.	
4.		5.		6.	
7.		8.		9.	
10.		11.		12.	
13.		14.		15.	
16.		17.		18.	
19.		20.		21.	
22.		23.		24.	
25.		26.		27.	
28.		29.			

Free Response

30.		31.	
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32.		33.	
34.		35.	
36.		37.	
38.		39.	
40.		41.	
42.		43.	
44.		45.	
46.			
47.			
48.			
49.			
50.			

51.	
52.	
53.	a. b.
54.	Please attach a super carefully drawn, awesome graph using a straight-edge and graph paper!

$$1. \frac{\left(\frac{1}{3}\right)^{-1} - (-3)^{-1}}{\left(\frac{1}{2}\right)^{-1} - (-2)^{-1}} =$$

$$2. \frac{\frac{2}{m} + 6}{\frac{1}{n}} =$$

a.	b.	c.	d.
$\frac{12n}{m}$	$\frac{2n+6mn}{m}$	$\frac{6m+2}{mn}$	$\frac{m}{2n+6mn}$

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3. Write $(-32x^{10}y^{35})^{-\frac{1}{5}}$ in simplest form.

a.	b.	c.	d.
$2x^2y^7$	$-\frac{2}{x^2y^7}$	$-\frac{1}{2x^2y^7}$	$\frac{2}{x^2y^7}$

4. Simplify: $y^{\frac{2}{11}}y^{\frac{4}{11}} =$

a.	b.	c.	d.
$y^{\frac{2}{11}}$	$y^{\frac{6}{11}}$	$y^{\frac{12}{11}}$	$y^{\frac{8}{11}}$

5. Which expression is equivalent to $x^{n+5} \cdot x^{n-5}$?

a.	b.	c.	d.	e.
x^{2n}	x^{10}	x^{n^2-25}	$(x^2)^{n^2-25}$	x^{n^2}

6. Which of the following is an equation of the line through the point $(-2,3)$ with slope 4?

a. $y - 3 = 4(x + 2)$

b. $y + 3 = 4(x - 2)$

c. $x - 3 = 4(y + 2)$

d. $x + 3 = 4(y - 2)$

e. $y + 2 = 4(x - 3)$

7. Which of the following is an equation of the vertical line through $(-2,4)$?

a.	b.	c.	d.	e.
$y = 4$	$x = 2$	$y = -4$	$x = 0$	$x = -2$

8. Which of the following is the solution to $x^2 - 2x + 2 \geq 0$? Solve by making a number-line/sign chart.

a. $[0,2]$

b. $(-\infty,0) \cup (2,\infty)$

c. $(-\infty,0] \cup [2,\infty)$

d. All real numbers

e. There is no solution

9. Which of the following is the solution to $x^2 \geq x$. Solve by making a number-line/sign chart.

- a. $(-\infty, 0) \cup (1, \infty)$
- b. $(-\infty, 0] \cup [1, \infty)$
- c. $(1, \infty)$
- d. $(0, \infty)$
- e. There is no solution

10. What are the zeros of $\frac{x^4 - 13x^2 + 36}{x^3 + x^2 - 6x}$?

a.	b.	c.	d.	e.
$0, \pm 2, 3$	$0, 3$	$2, \pm 3$	$-2, 3$	$0, \pm 2, \pm 3$

11. The Simon brothers rowed 18 km upstream in 3.75 h. The return trip with the same current took only 2.5 h. What was the speed of the current?

a.	$1 \frac{km}{h}$
b.	$1.2 \frac{km}{h}$
c.	$4.5 \frac{km}{h}$
d.	$6 \frac{km}{h}$
e.	$6.5 \frac{km}{h}$

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12. Simplify: $\frac{3}{4x^2 - 25} + \frac{2}{2x + 5}$

a.	$\frac{4x+7}{(2x+5)(2x-5)}$
b.	$\frac{4x-10}{(2x+5)(2x-5)}$
c.	$\frac{4x-7}{(2x+5)(2x-5)}$
d.	$\frac{5}{(2x+5)(2x-5)}$

13. Simplify: $\frac{8}{y+2} - \frac{3y}{y^2-4}$

a.	$\frac{5y-16}{(y+2)(y+2)}$
b.	$\frac{8-3y}{(y+2)(y^2-4)}$
c.	$\frac{5y-16}{(y+2)(y^2-4)}$
d.	$\frac{5y+16}{(y+2)(y+2)}$

14. Simplify: $\frac{30x^2 + 53x + 22}{70x^2 + 17x - 66}$ Assume that no denominator is equal to zero.

a.	$\frac{3x-2}{7x+6}$
b.	$\frac{3x-2}{7x-6}$
c.	$\frac{3x+2}{7x-6}$
d.	$\frac{3x+2}{7x+6}$

15. Find the inverse of $f(x) = \frac{7x-3}{16}$

a.	$f^{-1}(x) = \frac{16x-3}{7}$
b.	$f^{-1}(x) = \frac{16x+3}{7}$
c.	$f^{-1}(x) = \frac{7x+16}{3}$
d.	$f^{-1}(x) = \frac{7x-16}{3}$

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16. Simplify $7 \sin \theta \sec \theta$

a.	b.	c.	d.
$7 \cot \theta$	$7 \cos \theta$	$7 \tan \theta$	7

17. Simplify: $\frac{\cos^2 \theta - 1}{12 \sin^2 \theta}$

a.	b.	c.	d.
$\frac{-\sin \theta}{12}$	$\frac{1}{12}$	$-\frac{1}{12}$	$\frac{\cos \theta}{12}$

18. Find the domain of $f(x) = \frac{x^2 - 9x + 2}{x^2 - 4x + 3}$

a.	b.	c.	d.
$x \neq 1, 3$	$x \neq -1, -3$	$x \neq -5, -4$	$x \neq 5, 4$

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19. Find the vertical asymptote(s), if any, for $f(x) = \frac{x-7}{x^2-5x+6}$

a.	b.	c.	d.
$x = 7, x = 2$	$x = 2, x = 3$	$x = 2, x = 3, x = 7$	No vertical asymptotes

20. Find the vertical asymptote(s), if any, for $f(x) = \frac{2x^2+8}{3x^2+4x-1}$ 21. Evaluate: $\ln e^2$

a.	b.	c.	d.
e^2	$\ln 2^e$	2^e	2

22. Evaluate: $e^{\ln 14}$

a.	b.	c.	d.
$\ln 14^e$	14	$\ln 14e$	e^{14}

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23. Solve for x : $10 + 5e^{2x} = 17$

a.	$\frac{7}{5}$
b.	$x = \ln \frac{7}{10}$
c.	$x = 2 \ln \frac{5}{7}$
d.	$x = \frac{1}{2} \ln \frac{7}{5}$

24. Write $3 \ln 5 - \ln 2$ as a single logarithm.

a.	b.	c.	d.
$\ln 7.5$	$\ln 27$	$\ln \left(\frac{5}{2} \right)^3$	$\ln 62.5$

25. Solve $e^{x+1} = 13$

a.	b.	c.	d.
$x = \ln 13 + 1$	$x = \ln 13 - 1$	$x = \ln 13$	$x = \ln 12$

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26. Simplify: $\tan\left(\sin^{-1}\frac{1}{2}\right)$

a.	b.	c.	d.
2	$\sqrt{3}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$

27. $\cos^2 x \sec^2 x - \cos^2 x =$

a.	b.	c.	d.
$\cos^2 x \cot^2 x$	$\cos^2 x$	1	$\sin^2 x$

28. $\frac{1 - \cos \theta}{\sin \theta} + \frac{\sin \theta}{1 - \cos \theta} =$

a.	b.	c.	d.
$2 \csc \theta$	0	$2 \sin \theta$	$2 + \cos \theta$

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Short answer: You must show necessary work to receive credit.

29. Factor completely: $x^6 - 16x^4$

30. Factor completely: $4x^3 - 8x^2 - 25x + 50$

31. Factor completely: $8x^3 + 27$

32. Factor completely: $x^4 - 1$

33. Find the exact (not decimal approximation) solution to $3 \ln 4x = 13$

34. Solve $\cos^2 x - \sin^2 x = \sin x$; $0 \leq x < 2\pi$ without using a calculator. That is, give exact solutions.

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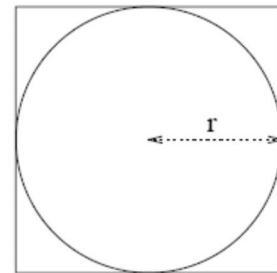
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Evaluate each WITHOUT a calculator. Show how you use triangles/the unit circle.

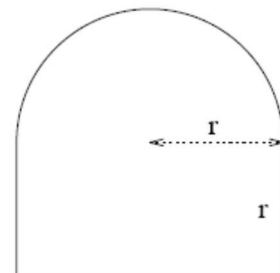
Recall that the range for inverse trig functions are subsets of the real numbers, NOT angles in degrees.

35. $\cos \frac{7\pi}{6}$	36. $\sin \frac{5\pi}{4}$	37. $\tan^{-1}(-1)$
38. $\sin^{-1}(-1)$	39. $\cos \frac{9\pi}{4}$	40. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$
41. $\tan \frac{7\pi}{6}$	42. $\cos^{-1}(-1)$	43. $\cos \frac{5\pi}{3}$

44. Find the *ratio* of the area inside the square but outside the circle to the area of the square.



45. Find a formula for the *perimeter* of a window of the shape in the picture which is a semi-circle on top of a rectangle.



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46. Write $y = |2x - 4|$ as a piecewise expression.

If $f(x) = x^2 - 1$, describe in WORDS what each transformation would do to the graph of $f(x)$:

47. $f(x) - 4$ _____

48. $f(x - 4)$ _____

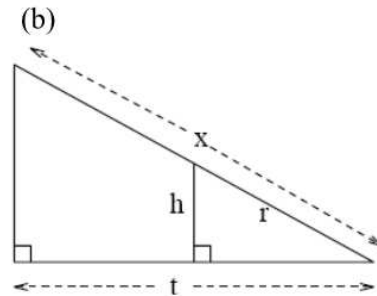
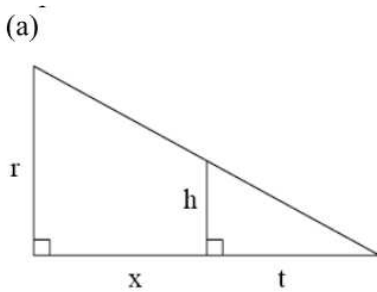
49. $-f(x + 2)$ _____

50. $|f(x)|$ _____

51. Find the domain of $f(x) = \frac{3x+1}{\sqrt{x^2+x-2}}$

52. Simplify $\frac{f(x+h)-f(x)}{h}$, for $f(x) = \frac{1}{x+1}$.

53. Express x in terms of the other variables in the diagram.



54. Use graph paper and sketch the graph of the piecewise function. Label VERY WELL!

$$f(x) = \begin{cases} -\sin\left(\frac{\pi x}{2}\right) & , -4 \leq x \leq -2 \\ \frac{1}{x+2} + 1 & , -2 < x \leq 0 \\ 3 - \frac{x}{2} & , 0 < x \leq 2 \\ \log_2(x-2) & , 2 < x \leq 6 \end{cases}$$