King School

Math 500 – AP Calculus AB

Summer Assignment

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.

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.	
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 carefully-drawn graph using a straight-edge and graph paper!

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

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

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

3. Write $\left(-32x^{10}y^{35}\right)^{-\frac{1}{5}}$ 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}	$\left(x^2\right)^{n^2-25}$	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 $\dfrac{x^4 - 13x^2 + 36}{x^3 + x^2 - 6x}$?

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

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.	$f^{-1}(x)=\frac{7x-16}{3}$

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

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

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

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

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

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

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

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 $f(x)=\dfrac{2x^2+8}{3x^2+4x-1}$

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}

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.
$x=\ln 13+1$	$x=\ln 13-1$	$x=\ln 13$	$x=\ln 12$

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	$2\sin\theta$	$2+\cos\theta$

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 $3\ln 4x = 13$

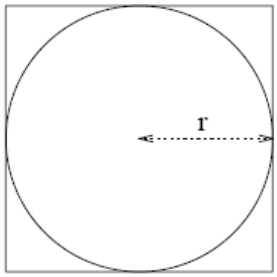
34. Solve $\cos^2 x - \sin^2 x = \sin x; \quad 0 \le x < 2\pi$ without using a calculator. That is, give exact solutions.

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

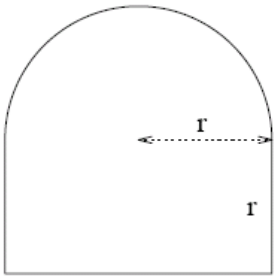
Recall that the range for inverse trig functions are subsets of the real numbers, NOT angles in degrees.

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.



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. $-f(x + 2)$ _____

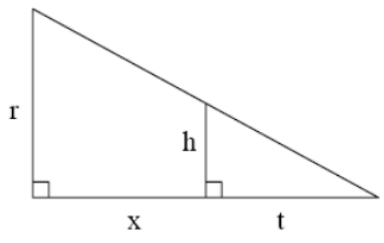
50. $|f(x)|$ _____

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

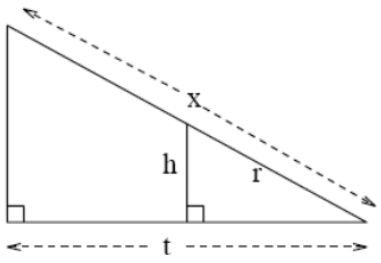
52. Simplify $\dfrac{f(x+h)-f(x)}{h}$, for $f(x)=\dfrac{1}{x+1}$.

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

(a)



(b)



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

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