

Preparation for Advanced Calculus AB

These book problems and worksheets are due on the **first** day of class as your first homework grade of the year.

All of the concepts and topics covered in this summer work, no matter how briefly, is understanding you are expected to bring forward from previous math courses and be able to use and apply with ease. The material in this packet will not be revisited beyond the first few days of the Advanced Calculus AB course. It is advised you keep this as a resource if and when you encounter problems or topics that require a refresher.

First, read the following lessons from our textbook, then complete the problems listed. *Check your solutions to odd problems in the back of the text.*

Calculus

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Author: Larson

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Year: 2006

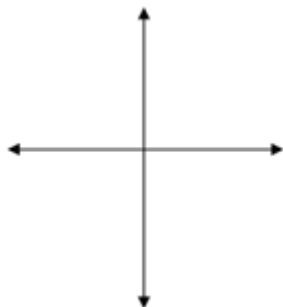
Lesson / Section	Problem Numbers
P.1	# (1 – 4, 9 – 12, 15, 19, 29, 55, 57, 69, 81, 83)
P.2	# (13, 19, 21b, 23, 31, 35, 43, 53, 57, 59, 65, 69, 77)
P.3	# (1, 7, 9, 17, 19, 21, 25, 31, 33, 35 – 37, 39, 41, 43, 47 – 52 all, 55, 57, 61, 63, 65, 67, 69, 71, 73, 77, 78, 84, 93)
P.4	None
Problem Solving, p.39	# (3, 5, 7)

Second, complete the attached worksheets and review topics as required.

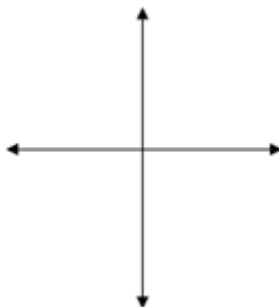
Functions

Sketch each of the following functions and state their domain and range. Sketch any asymptotes. You should have these functions and their characteristics memorized.

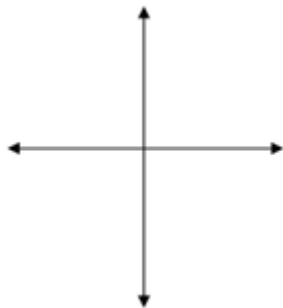
$y = x$



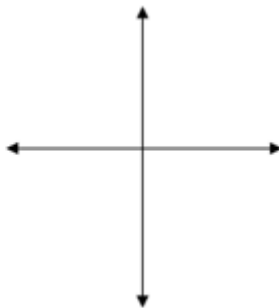
$y = |x|$



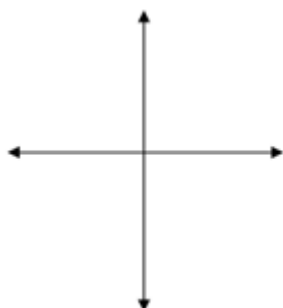
$y = x^2$



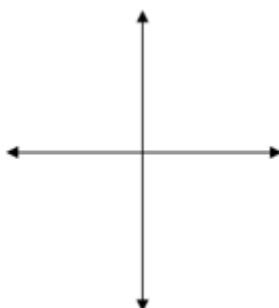
$y = \sqrt{x}$



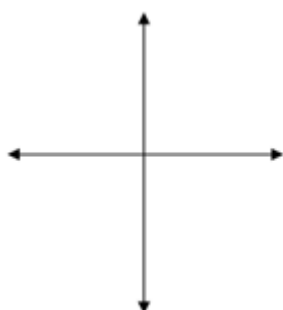
$y = x^3$



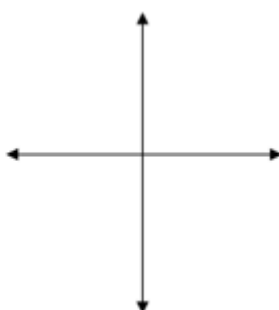
$y = \sqrt[3]{x}$



$y = \frac{1}{x}$



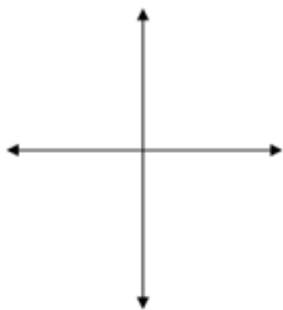
$y = \frac{1}{x^2}$



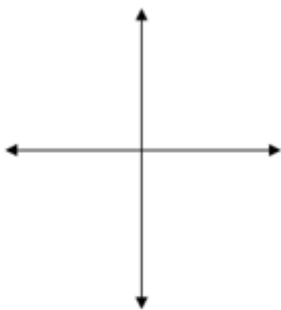
SUMMER WORK

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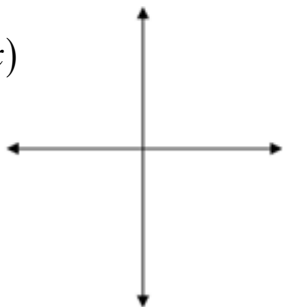
$$y = e^x$$



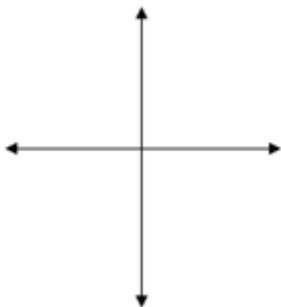
$$y = \ln(x)$$



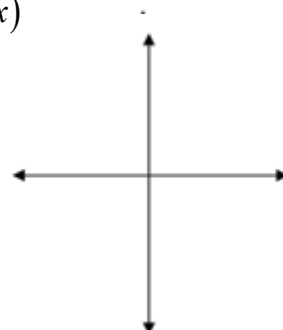
$$y = \sin(x)$$



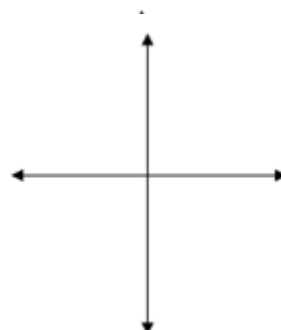
$$y = \arcsin(x)$$



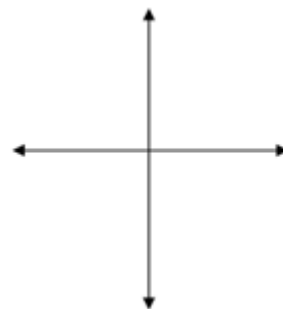
$$y = \cos(x)$$



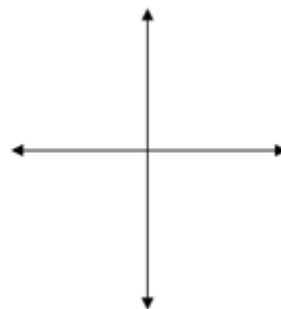
$$y = \arccos(x)$$



$$y = \tan(x)$$



$$x^2 + y^2 = r^2$$



Functions, Part II

Evaluate the function $\frac{f(x+\Delta x)-f(x)}{\Delta x}$ at the given values of the independent variable x . Simplify fully.

a) $f(x) = x$

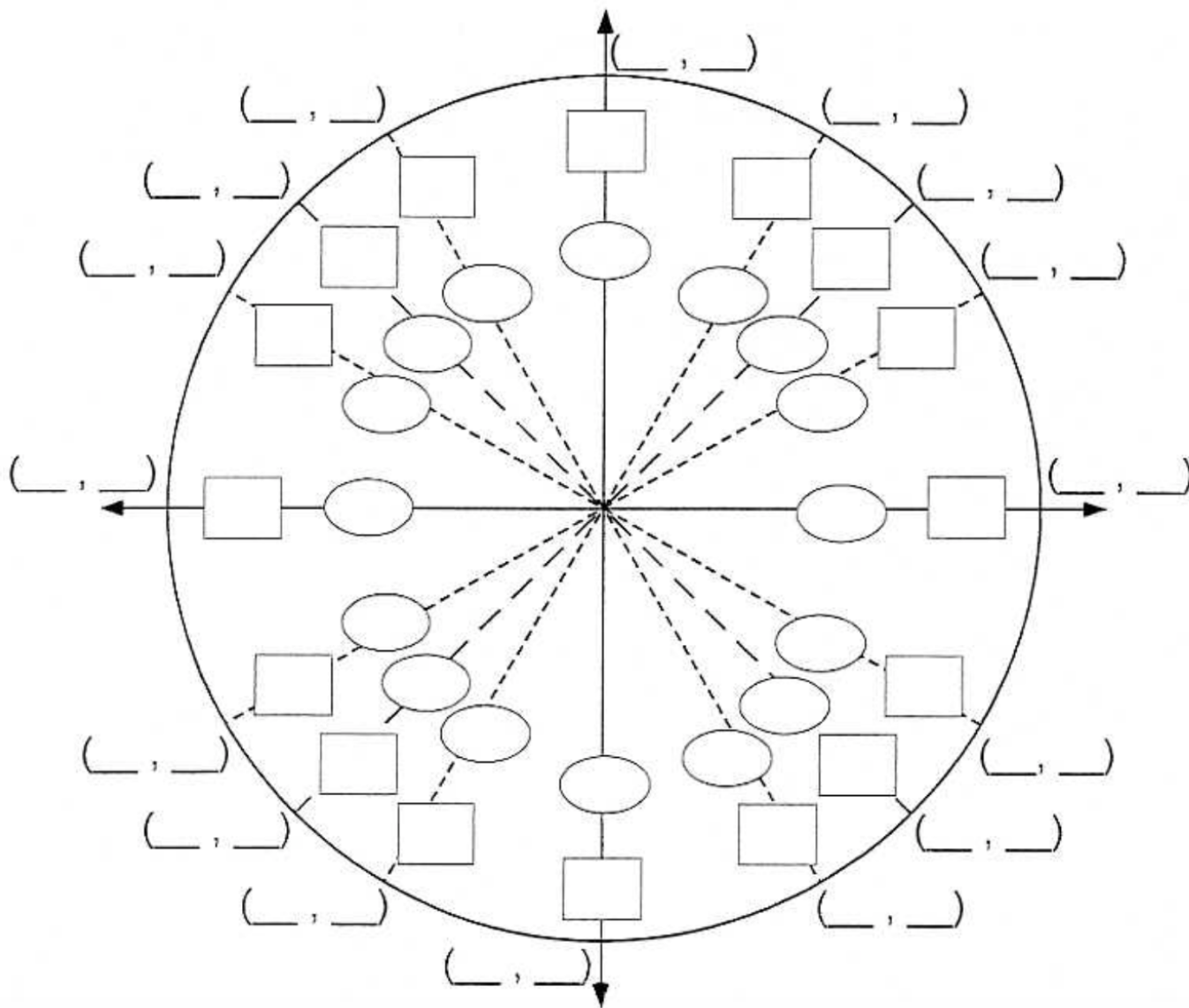
b) $f(x) = x^2$

c) $f(x) = \frac{1}{x}$

d) $f(x) = x^2 - 2x + 1$

Unit Circle

Fill in the entire unit circle, including both radian and degree measures. You should complete as much of this from memory as possible, so that you can assess your level of recollection. Once you are finished, find a unit circle online and check (and correct!) your circle.



Trig Ratios for Special Angles

Fill in and memorize the values in the following table. You should be able to come up with these values without having to draw or consult the unit circle each time.

Angle (degree)	Angle (radians)	$\sin(x)$	$\cos(x)$	$\tan(x)$
0				
30				
45				
60				
90				

Find exact values for the following trig ratios:

a) $\cos\left(\frac{11\pi}{6}\right)$

b) $\sin\left(\frac{7\pi}{6}\right)$

c) $\tan\left(\frac{3\pi}{4}\right)$

d) $\sin\left(-\frac{3\pi}{4}\right)$

e) $\sin\left(\frac{5\pi}{3}\right)$

f) $\cos\left(\frac{7\pi}{3}\right)$

g) $\sin\left(\frac{17\pi}{6}\right)$

h) $\tan\left(\frac{18\pi}{6}\right)$

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Trigonometric Identities

Write the three Pythagorean identities:

Simplify each expression.

a) $\cos t + \tan t \sin t$

b) $\frac{\sin x}{\cos x} + \frac{\cos x}{1 + \sin x}$

c) $\frac{\sec^2 x - 1}{\sec^2 x}$

Solve each equation on the interval $[0, 2\pi)$.

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Trigonometric Equations

Solve each equation on the interval $[0, 2\pi)$.

a) $2 \cos x = 0$

b) $\sin x - \cos x = 0$

c) $2 \sin x + 1 = 0$

d) $\tan^2 x - 3 = 0$

e) $8 \sin 2x - 4\sqrt{2} = 0$

f) $1 + \cos x = 4 \sin^2 x$

g) $3\cos^2 x - 13 \cos x + 4 = 0.$

Properties of Logarithms

$$\log_b(xy) = \log_b x + \log_b y$$

$$\log_b\left(\frac{x}{y}\right) = \log_b x - \log_b y$$

$$\log_b x^n = n \log_b x$$

Use the properties of logarithms to expand the following:

a) $\ln(xy^2)$

b) $\log\left(\frac{1}{\sqrt{x}}\right)$

c) $\ln\left(\frac{(x+4)^2}{x}\right)$

d) $\log\left(\frac{x^2(x-1)^3}{2-x}\right)$

Use the properties of logarithms to condense the following:

a) $3 \ln x + \ln y - 6 \ln z$

b) $2 \log(x-1) + \log x - \frac{1}{2} \log x$

c) $2(\log_3 x - \log_3(x+8))$

d) $\frac{1}{2}(3 \ln(x+1) + \ln 5 - 2 \ln x).$

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Simplifying Rational Expressions

Perform the operation and simplify the following:

a) $(2x)^4$

b) $\frac{t}{t^{1/3}}$

c) $\frac{3}{x-1} + \frac{x}{x+2}$ (need a common denominator)

d) $\frac{1}{x^2-1} - \frac{2}{(x+1)^2}$ (find least common denominator)

e) $\frac{\frac{1}{a-h} - \frac{1}{a}}{h}$ (simplify the numerator into one fraction first)

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f) $\frac{\frac{x}{y} - \frac{y}{x}}{\frac{1}{x^2} - \frac{1}{y^2}}$

g) $\frac{(1+x^2)^{1/2} - x^2(1+x^2)^{-1/2}}{1+x^2}$ (factor out the common factor)

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h)
$$\frac{(x-h)^3 - 7(x+h) - (x^3 - 7x)}{h}$$

i)
$$\frac{1}{\sqrt{x}+1}$$
 (rationalize the denominator)

j)
$$\frac{\sqrt{r} + \sqrt{2}}{5}$$
 (rationalize the numerator)