Skills from previous math classes that you need to self-review for Math 1A

From Algebra:

Numeracy
- What is $0 \div 1$? $1 \div 0$? $0 \div 0$?
- What happens when you add/subtract/multiply/divide a number very close to 0 and a number very close to 0 ?
- What happens when you add/subtract/multiply/divide a number very close to 1 and a number very close to 0 ?
- What happens when you add/subtract/multiply/divide a number very close to 0 and a very large number ?
- What happens when you add/subtract/multiply/divide a very large number and another very large number ?

Equations of lines (slope-point form)
Absolute value inequalities
Quadratic functions
- Graphing
- Factoring
- Quadratic formula
- Completing the square

Negative and fractional exponents
Radical expressions
- Rationalizing denominators

Rational expressions
- Add / subtract
- Polynomial long division
- Simplifying complex fractions (quotients involving quotients)
- Asymptotes of rational functions

From Geometry:

Areas
- Triangles / circles / sectors

Similarity

From Trigonometry:

Sine / cosine / tangent of special angles on unit circle
Inverse sine / cosine / tangent of special values
Pythagorean / reciprocal / quotient / negative angle / co-function identities
Sum & difference of angles identities
Trigonometric equations

From Precalculus:

Graphs of basic functions (domain, range, intercepts, asymptotes, long run behavior)
- Power $y = x^n$ (n could be positive or negative, even or odd or reciprocal of integer)
- Exponential $y = b^x$ (b could be greater than or less than 1)
- Logarithmic $y = \log_b x$ (b could be greater than or less than 1)
- Trigonometric $y = \sin x$, $y = \cos x$, $y = \tan x$, $y = \csc x$, $y = \sec x$ or $y = \cot x$
- Inverse trigonometric $y = \sin^{-1} x$, $y = \cos^{-1} x$ or $y = \tan^{-1} x$

Piecewise functions
- Graphing
- Piecewise definition of absolute value

Graphs of basic conics
- Circles / ellipses / parabolas

Single step transformations of functions & graphs (relationship between algebraic & graphical transformations)
- Horizontal / vertical
- Shift / reflect / stretch & compress

Symmetry of functions & graphs (relationship between algebraic & graphical symmetry)
- Even / odd

Polynomial inequalities

Unless stated otherwise, you must be able to solve these without your calculator

[1] Fill in the blanks. The answer is either a number, "undefined", "cannot be determined without more information":

$\frac{1}{0} =$ $\frac{0}{1} =$ $\frac{0}{0} =$

[2] Let a, b be positive real numbers that are very close to 0. Let A, B be positive real numbers that are very large.
Describe the size of the following expressions.
The answer is either "very close to 0", "very close to 1", "very large" or "cannot be determined without more information".

[i] $a+b$ [ii] $a-b$ [iii] $a\times b$ [iv] $\frac{a}{b}$ [v] $A+B$ [vi] $A-B$ [vii] $A\times B$

[viii] $\frac{A}{B}$ [ix] $a+A$ [x] $a-A$ [xi] $A-a$ [xii] $a\times A$ [xiii] $\frac{a}{A}$ [xiv] $\frac{A}{a}$

[xv] $\frac{1}{a}$ [xvi] $\frac{1}{A}$

[3] Find the slope-point form of the equation of the line through the points $(-1,-3)$ and $(-6,4)$.

[4] Sketch $f(x)=x^2-6x-16$ by finding the $x-$ and $y-$ intercepts and the vertex (without any additional points).

[5] Solve $3x^2-2x=9$.

[6] Complete the square for $-2x^2+24x-3$. **NOTE: This does NOT involve solving an equation.**

[7] Fill in the blanks. Write your answer without using exponents and without using radicals.

$16^{\frac{1}{2}} =$ $8^{-3} =$ $\left(\frac{27}{8}\right)^{\frac{1}{3}} =$ $\left(\frac{4}{9}\right)^{-2} =$ $64^{-\frac{2}{3}} =$

[8] Simplify $\frac{x^3\sqrt{12x}}{3x^{-2}}$ by writing it in the form ax^n.

[9] Simplify $\frac{8}{\sqrt{3}+\sqrt{5}}$ by rationalizing the denominator.

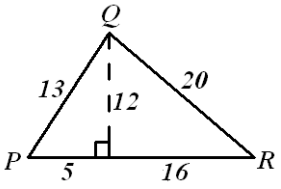
[10] Add and simplify $\frac{x-7}{x^2-4x+3}+\frac{x+7}{x^2-x-6}$.

[11] Rewrite $(2x^3-6x^2-3x+7)\div(x^2-2x+3)$ using polynomial long division.

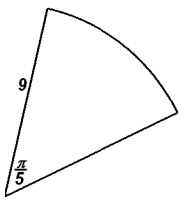
[12] If $f(x)=\frac{1}{1-2x}$, simplify $\frac{f(x+h)-f(x)}{h}$.

[13] Find all vertical asymptotes for the function $f(x)=\frac{x^2-4}{x^2-x-12}$.

[14] Find the area of the triangle PQR on the right.



[15] Find the area of the sector on the right with the given radius and central angle (in radians).



[16] Fill in the blanks.

$e^0 =$ $\ln 0 =$ $e^1 =$ $\ln 1 =$ $\ln\sqrt{e} =$ $\ln\frac{1}{e^3} =$

[17] Fill in the following table with all entries (in radians) that have exact values. Also, identify the entries which do not exist.

$x =$	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{3}}{3}$	$-\frac{\sqrt{2}}{2}$	$-\sqrt{3}$	$-\frac{1}{2}$	-1	0	1	$\frac{1}{2}$	$\sqrt{3}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{3}$	$\frac{\sqrt{3}}{2}$
$\tan^{-1} x =$													
$\cos^{-1} x =$													
$\sin^{-1} x =$													

[18] State the following trigonometric identities.

[a] the 3 Pythagorean identities that involve the 6 trigonometric functions

[b] the co-function identities for each of the 6 trigonometric functions

[c] the double angle identities for $\cos 2x$ (3 versions) and $\sin 2x$

[19] Simplify $\sin(x-\pi)$.

[20] Simplify $\cos(2\pi - x)$.

[21] Find all solutions of $1+3\sin x = 0$, where $0 \le x \le 2\pi$. **[You will need to use your calculator.]**

[22] Find all solutions of $\cos 2x = -\frac{\sqrt{3}}{2}$.

[23] Sketch the general shape and position of the following graphs. Do not worry about specific $x-$ and $y-$ coordinates.

$y = x^5$ $y = x^{-4}$ $y = x^{\frac{1}{3}}$

$y = e^x$ $y = 0.5^x$

$y = \ln x$ $y = \log_{0.4} x$

$y = \cos x$ $y = \tan x$ $y = \csc x$

$y = \sin^{-1} x$ $y = \cos^{-1} x$ $y = \tan^{-1} x$

$x^2 + y^2 = 9$ $4x^2 + 9y^2 = 144$

[24] The graph of $f(x)$ is shown on the right. Sketch the following graphs.

$y = f(x) - 2$

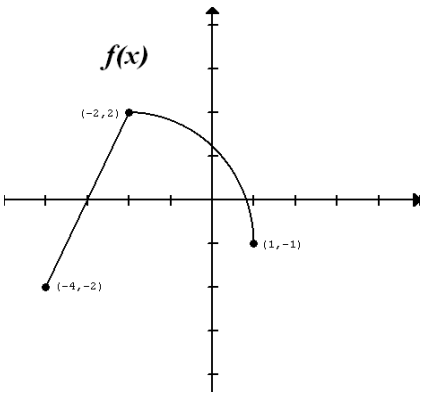
$y = f(x+2)$

$y = f(2x)$

$y = 2f(x)$

$y = f(-x)$

$y = -f(x)$



[25] Sketch the function $f(x)=\begin{cases}2x-3, & x<-1\\ 1-x^2, & x\geq -1\end{cases}$.

[26] Determine algebraically if $f(x)=x\sqrt{1+x^2}$ is symmetric about the $y-$ axis, about the origin or neither.

[27] Determine algebraically if $f(x)=\sin x-\cos x$ is even, odd or neither.

[28] Solve the inequality $x^3+2x<3x^2$.