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

From Algebra:

Negative and fractional exponents
Rational expressions
- Add / subtract
- Polynomial long division

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
Double angle identity
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 $y = \sin x$, $y = \cos x$, $y = \tan x$

Graphs of basic conics
- Circles / ellipses / parabolas / hyperbolas

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

Sequences
- General formula

Sigma notation for series
Factorials

From Calculus:

Limits (especially involving infinity)
Continuity
Derivatives (and their relationship to increasing/decreasing behavior of functions)
Linear approximations
L'Hospital's rule
Anti-derivatives (basic, substitution, by parts)
Improper integrals

You must be able to solve these
using neither your calculator nor any external aid
All answers must be completely simplified

[1] Find $81^{-\frac{3}{4}}$.

[2] Simplify $\dfrac{x^{-\frac{2}{3}}x^{\frac{3}{4}}}{x^{-\frac{1}{2}}}$.

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

[4] Perform the long division $\dfrac{x^4-x^3-x^2}{x^2+2x+5}$.

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

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

[7] Fill in the following table with all **function** values (in radians) that have exact values. (Some entries have values which can only be found using a calculator. Mark those as "NEED CALC".) Also, identify the entries which do not exist (ie. have no function value).

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

[8] Let $\theta=\frac{\pi}{7}$.

[a] Find an angle with positive measure that is co-terminal with θ.

[b] Find an angle with negative measure that is co-terminal with θ.

[c] Find 3 angles between 0 and 2π that have θ as their reference angle, not including θ itself.

[9] 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 $\sin 2x$

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

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

[12] Find all solutions of $1+2\cos x=0$, where $0\le x\le 2\pi$.

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

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

$y = x^5$	$y = x^{-4}$	$y = x^{\frac{1}{3}}$	
$y = e^x$	$y = 0.5^x$		
$y = \ln x$	$y = \log_{0.4} x$		
$y = \sin x$	$y = \cos x$	$y = \tan x$	
$4x^2 + 4y^2 = 36$	$4x^2 + 9y^2 = 36$	$4y^2 - x^2 = 36$	$4y^2 - x = 36$

[15] Write the series $\frac{3}{2^2 \cdot 4^0} - \frac{4}{3^2 \cdot 4^1} + \frac{5}{4^2 \cdot 4^2} - \frac{6}{5^2 \cdot 4^3} + \frac{7}{6^2 \cdot 4^4} - \frac{8}{7^2 \cdot 4^5}$ in sigma notation with a lower limit of summation of 1.

[16] Simplify $\frac{(2n-1)!}{(2n+1)!}$.

[17] Find $\frac{d^3}{dx^3} \arcsin x$.

[18] Find $\frac{d^3}{dx^3} \cot^2 x$.

[19] If $f'(x) = (1-x)(2+x)^3(3-x)^2$, determine the intervals over which f is decreasing.

[20] Determine if $\int_0^\infty te^{-2t}\,dt$ converges or diverges. If it converges, find its value.

[21] Determine if $\int_2^\infty \frac{1}{x \ln x}\,dx$ converges or diverges. If it converges, find its value.

[22] Rewrite the expression $\frac{12(2^{3x-5})}{3^{2x-1}}$ in the form $a \cdot b^x$, where a and b are simplified constants, and the exponent of b is only the variable x.