Take no more than 5 minutes on question 0...

0.)

Oops! Looks like the American dollar went belly-up last week, and as a result, society has completely collapsed across the globe![1] Eventually, maybe civilization will rebuild, but for now, it's total chaos—there's no longer such thing as currency, half the city is on fire, and the police and army have both fractured into a complicated web of warring factions. You and your group have to band up to survive. In the space below, determine a) what your top priorities for survival should be in the immediate term and b) what role each member will play for your team.

1.)

(Pre-calc review) Each of the following prompts corresponds to exactly one of the options from the "answer bank." Each answer in the answer bank corresponds to at most one prompt. Match answers to prompts! **!!!DO NOT USE A CALCULATOR OR LOOK UP ANY FORMULAS BESIDES THE ONES GIVEN!!!**

Formulas & Definitions

$\tan(x) = \frac{\sin(x)}{\cos(x)}$, $\sec(x) = \frac{1}{\cos(x)}$, $\csc(x) = \frac{1}{\sin(x)}$, $\cot(x) = \frac{1}{\tan(x)}$, $1 = \cos^2 x + \sin^2 x$

Round 1

1. An equation giving a circle of radius 2 centered at $(2, 3)$: _____
2. An equation giving a line perpendicular to the line between $(1, 0)$ and $(5, 3)$: _____
3. $\tan(\pi/6) - \cot(\pi/6)$: _____
4. An equation giving a line which intersects the parabola $y = x^2$ *exactly* once: _____
5. $\dfrac{\ln 32 + \ln 2}{\ln 4}$: _____
6. An equation giving a circle of radius 4 centered at $(-2, -3)$: _____
7. A solution to the equation $y = x^2 + \frac{2}{3}x - \frac{53}{6}$: _____
8. $\dfrac{\sin \pi/2}{\cos \pi/3}$: _____

Answer Bank:

A) $y = -\frac{4}{3}x + \frac{6}{5}$	***B)*** $(x-2)^2 + (y-3)^2 = 16$	***C)*** $y = -\frac{3}{4}x + \frac{6}{8}$	***D)*** 3	
E) $(x-2)^2 + (y-3)^2 = 4$	***F)*** $\frac{\sqrt{3}}{3}$	***G)*** $(x+2)^2 + (y+3)^2 = 2$	***H)*** 2	***I)*** $\frac{-2}{\sqrt{3}}$
J) $y = \frac{4}{3}x - \frac{1}{9}$	***K)*** $(x+2)^2 + (y+3)^2 = 16$	***L)*** $\frac{3}{\sqrt{3}}$	***M)*** $\sqrt{6} - \frac{1}{3}$	

[1] Maybe next time, consider using something less volatile as the world's reserve currency—for now though, tough luck.

Round 2

1. $|\tan x|$: _____
2. $\dfrac{1-2\cos^2 x}{\cos^2 x - \sin^2 x}$
3. $\dfrac{\cos^2(x)-\sin^2(x)}{2\cos^2(x)-1}$: _____
4. $|\cot x|$: _____
5. $\dfrac{-\cos^2 x}{\sin x - 1}$: _____
6. $\cot x - \sin x + \sin^3 x$: _____
7. $|\csc x|$: _____

Answer Bank:

A) $\dfrac{1-\cos x}{\sin x \sec x}$ ***B)*** $\sqrt{\dfrac{1+\tan^2 x}{\tan^2 x}}$ ***C)*** 1 ***D)*** $\sqrt{1-\sec^2(x)}$ ***E)*** $\dfrac{\sqrt{1-\sin^2(x)}}{\sqrt{1-\cos^2(x)}}$ ***F)*** $\sin x + 1$

2.)

a.)

Let $x_0 = 1$, and $f(x) = x^2 - 2x$. Compute the slope of the secant line between x_0 and $x_1 = 5$, $x_2 = 2$, $x_3 = 1.5$, $x_4 = 1.1$ and $x_5 = 1.01$. Use this to find an estimate for the slope of the tangent line to $y = f(x)$ at x_0.

b.)

Use the same techniques to estimate the slope of the tangent line for $f(x) = x^3$ at $x_0 = 1$.