All exams will consist solely of homework type problems.
All numeric answers must be exact, no decimals, no mixed
correlations. E.g., $\frac{3}{4}$, $\sqrt{2}$ not, $1\frac{1}{2}$ or 1.414...
Most properties of logarithms are the same as for exponentialization but

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<th>the symbols</th>
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| exchanged with | 1 | $\times$ | $\div$ | ( _ )$^a$

LOG PROPERTIES

$\log\alpha = 0$

$\log\beta = 1$

$\log\gamma = \log\alpha + \log\beta$

$\log\delta = \log\alpha - \log\beta$

$\log\epsilon = \alpha^\beta$

When $b = e$, $\log_b(b) = 1$ becomes: $\ln(e) = 1$

CHANGE OF BASE FORMULAE: $\log_a \gamma = \frac{\log_b \gamma}{\log_b \alpha}$

BASE Form Lemma. Every exponential function can be written in the form

$$N(t) = N_0 e^{kt}.$$ 

$N_0 = N(0)$ is the initial amount.
$k$, the coefficient of $t$, is the growth constant.
If $k > 0$, $N(t)$ measures exponential growth.
If $k < 0$, $N(t)$ measures exponential decay.

FACT: Every $a > 0$ can be written as a power of $e$: $a = e^{\ln a}$. Thus $2 = e^{\ln 2}$.

DEFINITION. Suppose the vertex of an angle is at the center of a circle
of radius $r$. Let $s$ be the length of the arc the angle intercepts on the circle. Then

$$\theta = \frac{s}{r}$$

is the radian measure of the angle. For unit circles, the
radius $r = 1$ and radian measure equals arc length: $\theta = s$.
Clockwise angles $\theta$ are negative.

CONVERSION FORMULAS. $180^\circ = \pi$ radians. Thus

$1^\circ = \frac{\pi}{180}$ radians and $1$ radian $= 180/\pi$ degrees.

DEFINITION. If an object travels a distance $d$ in time $t$, its linear speed
is $d/t$.

If an object rotates through an angle $\theta$ in time $t$, its rotational speed is $\omega = \theta / t$.

THEOREM. If a point rotates around a circle of radius $r$ with rotational speed $\omega$, then its linear speed is $r \omega$.

The unit circle has radius one and center $(0,0)$. There are four quadrants I, II, III, IV as pictured.

An angle is in standard position if its vertex is at the origin $(0,0)$ and its initial side is on the positive $x$-axis. The other side of the angle is the terminal side.

The trigonometric functions of $\theta$ are:

$$\sin \theta = y$$

$$\cos \theta = x$$

$$\tan \theta = \sin \theta / \cos \theta$$

Facts. Know the sin and cos (and hence tan, cot, sec and csc) of:

$$0, \pi/6, \pi/4, \pi/3, \pi/2.$$