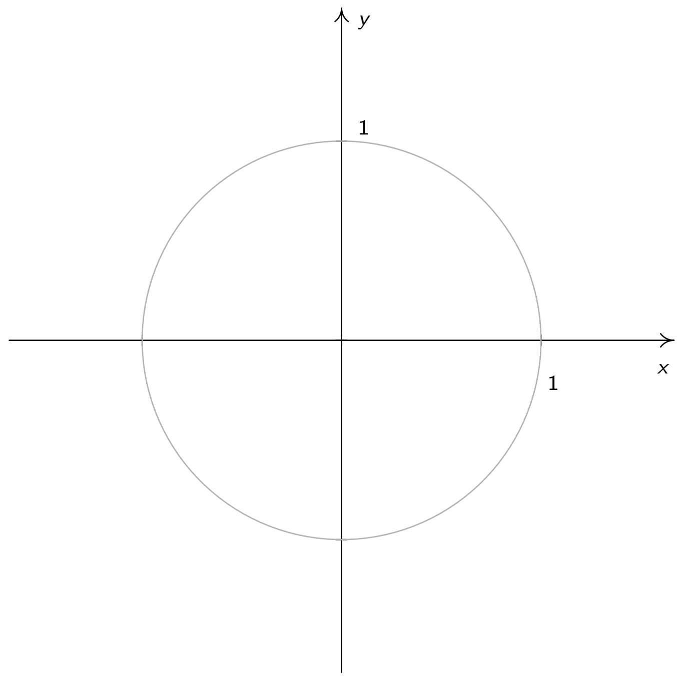
MATH 1700: TEST 01 (100 POINTS)

NAME: ____________________

DIRECTIONS: Make sure your work is neat and complete and uses the techniques demonstrated in class.

1. (a) Graph $\theta = -\dfrac{7\pi}{6}$ in standard position.



(b) Find the **reference** angle for θ.

(c) List the values of the six circular functions of θ:

- $\sin(\theta) =$
- $\cos(\theta) =$
- $\tan(\theta) =$
- $\csc(\theta) =$
- $\sec(\theta) =$
- $\cot(\theta) =$

(d) Find a **coterminal** angle for θ which lies between 0 and 2π.

2. Suppose α is an acute angle with $\sec(\alpha) = 4$.

   (a) Find the exact values of the remaining five trigonometric ratios of α.

   (b) Find a decimal approximation of α, rounded to the nearest hundredth of a degree.

3. From a point 150 feet from the base of a tree, the angle of inclination to the top of the tree is 65°.

   Find the height of the tree, rounded to the nearest foot.

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4. If θ is a Quadrant III angle with $\tan(\theta) = 2$, find the exact values of the remaning circular functions of θ.

$\sin(\theta) =$ $\cos(\theta) =$ $\csc(\theta) =$ $\sec(\theta) =$ $\cot(\theta) =$

5. If the terminal side of θ, when graphed in standard position, contains the point $(-5, 12)$, find the exact values of the circular functions of θ.

$\sin(\theta) =$ $\cos(\theta) =$ $\tan(\theta) =$ $\csc(\theta) =$ $\sec(\theta) =$ $\cot(\theta) =$

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6. Solve the following equations. Express your answers in radians. Be sure to represent all coterminal angles.

(a) $\sin(\theta) = \frac{1}{2}$.

(b) $\cos(t) = -\frac{\sqrt{2}}{2}$.

(c) $\tan(\alpha) = \sqrt{3}$.

(d) $\csc(\theta) = -\sqrt{2}$.

(e) $\sec(\theta) = 2$.

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7. (a) Graph one cycle of $f(t) = 3\cos\left(2t - \frac{\pi}{3}\right) - 1$. Label five 'key points' as was done in the lecture.

Find the period, frequency, amplitude, vertical shift (baseline), and phase (horizontal) shift.

period: frequency: amplitude: vertical shift: phase shift:

(b) Use your graph in part (a) to help you graph one cycle of $f(t) = 3\sec\left(2t - \frac{\pi}{3}\right) - 1$.

Label three points and the asymptotes.

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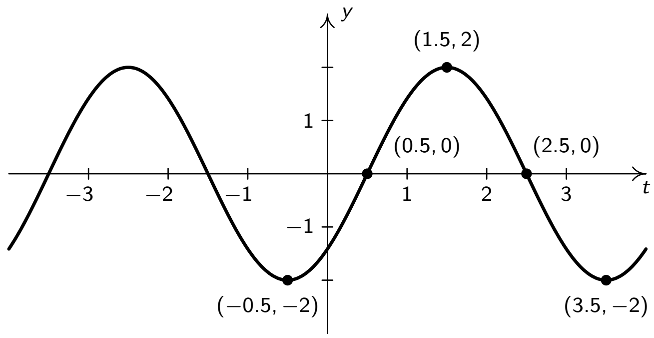
8. Find a formula for the sinusoid below in the form $S(t) = A\sin(\omega t + \phi) + B$. Explain your reasoning.



9. Graph one cycle of $T(t) = 3\tan\left(\frac{2t-\pi}{3}\right)$. Find and label the 'quarter marks' and asymptotes.

10. The hours of daylight Northeast Ohio receives can me modeled using a sinusoid: $S(t) = A\sin(\omega t + \phi) + B$.

    Here t is measured in months and $S(t)$ is measured in hours.

    (a) Assume the shortest amount of daylight we receive is 9 hours and the longest is 15 hours.

        Use these to help you determine the amplitude and vertical shift of the sinusoid.

    (b) Let's model the calendar year as the interval $[0, 12]$ where the interval $[0, 1]$ corresponds to the month of January, the interval $[1, 2]$ corresponds to the month of February, etc. Use the fact that the longest day is towards the end of June (say $t = 5.67$) to help you determine the frequency and phase shift.

        Round your answers to two decimal places.

    (c) Use your answers to parts (a) and (b) to find a model of the form: $S(t) = A\sin(\omega t + \phi) + B$.

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IMPORTANT POINTS ON THE UNIT CIRCLE