

- (20 pts) Find the values of all six trigonometric functions, given $\tan(u) = \frac{2}{3}$ and $\sin(u) < 0$.
- (20 pts) Find $\sin\left(\frac{u}{2}\right)$, $\cos\left(\frac{u}{2}\right)$, and $\tan\left(\frac{u}{2}\right)$, given that $\cos(u) = \frac{3}{4}$ and $\frac{3\pi}{2} \leq u < 2\pi$.
- Consider the equation $2\sin^2(x) - 1 = 0$.
 - (20 pts) Find all solutions x , in radians *and* degrees, to the equation in the interval $[0, 2\pi)$.
 - (10 pts) Find all real solutions x , in radians *and* degrees.
- (10 pts) Re-write $\sin\left(\cos^{-1}\left(\frac{x}{11}\right)\right)$ as an algebraic expression.
- (5 pts) Square both sides of $\sin(x) + 1 = \cos(x)$ and solve. Find all solutions in $[0, 2\pi)$. Give *exact* solutions in degrees and radians.
- Find the *exact* value of $\cos\left(\frac{7\pi}{8}\right)$ in two ways: (Hint: If degrees are easier for you, *use degrees*.)
 - (10 pts) Use a Sum identity.
 - (10 pts) Use a Half-Angle identity
- (5 pts) Re-write $\cos(\arctan(x) + \arccos(x))$ as an algebraic expression. (Hint: Use Sum identity.)
- (10 pts) Find $\sin(2u)$, $\cos(2u)$ and $\tan(2u)$, given that $\sin(u) = -\frac{3}{7}$ and $\cos(u) < 0$.
- (5 pts) Find the arc length on a circle of radius $r = 8$ that is intercepted by an angle of 2100° .

(10 pts) Bonus: Answer *one* of the following, for 10 points:

- What angle, in the interval $[0, 2\pi)$ is coterminal with $\frac{91\pi}{12}$?
- Build a cosine function that achieves its maximum height of $y = 27$ meters at time $x = 10$ seconds and its minimum height of $y = -8$ meters at $x = 77$ seconds.
- What is the area of the sector intercepted by an arc of 71° in a circle of radius 20? Round to 4 decimal places.
- Find all solutions of the equation $2\sin^2(3x) - 1 = 0$ in the interval $[0, 2\pi)$.
- Sketch the graph of $13\sin\left(\frac{\pi}{7}x + \frac{2\pi}{7}\right) + 5$.

