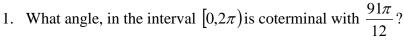
- 1. (20 pts) Find the values of all six trigonometric functions, given  $\tan(u) = \frac{3}{8}$  and  $\sin(u) < 0$ .
- 2. (20 pts) Find  $\sin\left(\frac{u}{2}\right)$ ,  $\cos\left(\frac{u}{2}\right)$ , and  $\tan\left(\frac{u}{2}\right)$ , given that  $\cos(u) = \frac{3}{4}$  and  $\frac{3\pi}{2} \le u < 2\pi$ .
- 3. Consider the equation  $4\sin^2(x) 3 = 0$ .
  - a. (20 pts) Find all solutions x, in radians and degrees, to the equation in the interval  $[0,2\pi)$ .
  - b. (10 pts) Find all real solutions x, in radians and degrees.
- 4. (10 pts) Re-write  $\sin\left(\tan^{-1}\left(\frac{x}{11}\right)\right)$  as an algebraic expression.
- 5. (5 pts) Square both sides of  $\sin(x)-1=\cos(x)$  and solve. Find all solutions in  $[0,2\pi)$ . Give answer in degrees and radians.
- 6. Find the *exact* value of  $\cos\left(\frac{11\pi}{12}\right)$  in two ways: (Hint: If degrees are easier for you, *use degrees*.)
  - a. (10 pts) Use a Sum identity.
  - b. (10 pts) Use a Half-Angle identity
- 7. (5 pts) Re-write  $\sin(\arctan(x) + \arccos(x))$  as an algebraic expression. (Hint: Use Sum identity.)
- 8. (10 pts) Find  $\sin(2u), \cos(2u)$  and  $\tan(2u)$ , given that  $\sin(u) = -\frac{3}{7}$  and  $\cos(u) < 0$ .
- 9. (5 pts) Find the arc length on a circle of radius r = 8 that is intercepted by an angle of  $2100^{\circ}$ .

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





- 2. 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.
- 3. What is the area of the sector intercepted by an arc of 71° in a circle of radius 20? Round to 4 decimal places.
- 4. Find all solutions of the equation  $4\sin^2(3x) 3 = 0$  in the interval  $[0,2\pi)$ .
- 5. Sketch the graph of  $13\sin\left(\frac{\pi}{7}x + \frac{2\pi}{7}\right) + 5$ .