Name: _____

Instructions: No books allowed. You may use the trig identities formula sheet, but no other notes are allowed. Please clearly show all of your work, particularly when you are verifying identities. For this portion of the test, you may not use a calculator. Each question is worth four points.

1. Give the exact value (simplify your result and rationalize any denominators).

   (a) $\sin \dfrac{\pi}{2} =$

   (b) $\cos \dfrac{\pi}{4} =$

   (c) $\tan \dfrac{2\pi}{3} =$

   (d) $\sec \dfrac{\pi}{3} =$

2. Give the exact value (simplify your result and rationalize any denominators).

   (a) $\cos \dfrac{7\pi}{6} =$

   (b) $\cot \dfrac{5\pi}{4} =$

   (c) $\sin \dfrac{11\pi}{6} =$

   (d) $\csc \dfrac{\pi}{4} =$

3. Give the exact value (simplify your result and rationalize any denominators).

(a) $\cos \dfrac{3\pi}{2} =$
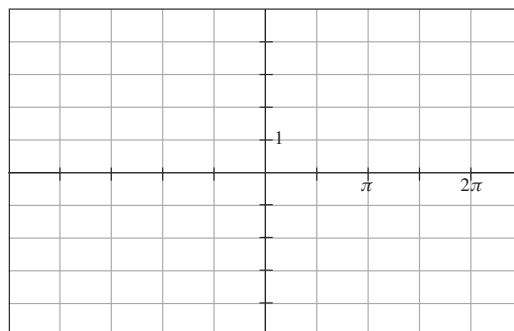
(b) $\tan \dfrac{5\pi}{6} =$

(c) $\cot \dfrac{\pi}{6} =$

(d) $\sec(2\pi) =$

4. (a) If $\sin \theta = 0.6$, what is $\sin(-\theta)$?

(b) If $\cos \theta = 0.2$, what is $\cos(\theta - 2\pi) + \cos(\theta + 2\pi)$?

5. Sketch the graph of the function $f(x) = \sin x + 2$. Be sure to accurately draw at least one period.
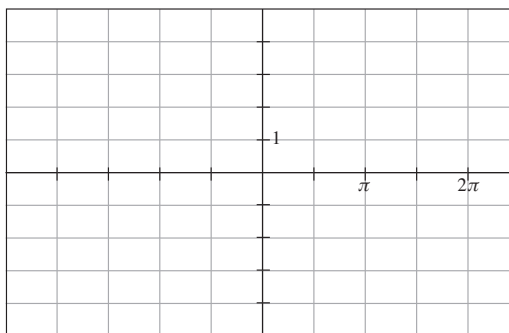
6. What are the period, amplitude, and phase shift of the function $f(x) = 2\sin(x - \pi/4)$? Use this information to graph the function. Draw at least one period.
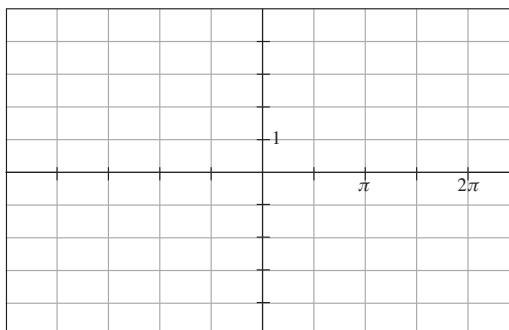
Period:

Amplitude:

Phrase shift:

7. What are the period, amplitude, and phase shift of the function $f(x) = \cos(2x - \pi)$? Use this information to graph the function. Draw at least one period.
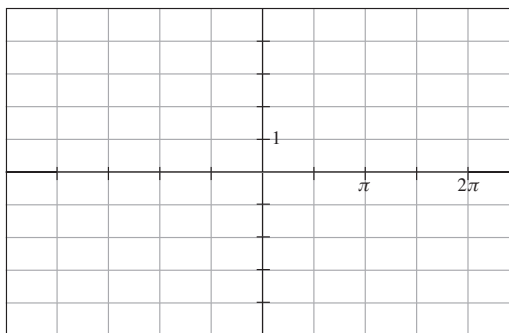
Period:

Amplitude:

Phrase shift:

8. Sketch the graph of the function $f(x) = -\sec x$. Draw at least one period.

9. Evaluate:

    (a) $\sin^{-1}(1) =$

    (b) $\cos^{-1}\left(\dfrac{\sqrt{2}}{2}\right) =$

    (c) $\tan^{-1}(\sqrt{3}) =$

    (d) $\cot^{-1}(1) =$

10. Evaluate:

    (a) $\sin\left(\cos^{-1}\left(\dfrac{3}{5}\right)\right) =$

    (b) $\tan\left(\sin^{-1}\left(-\dfrac{\sqrt{2}}{2}\right)\right) =$

11. Write each trigonometric expression as an algebraic expression in terms of u.

    (a) $\sin(\tan^{-1}(u)) =$

    (b) $\sin(2\cos^{-1}(u)) =$

12. Verify the identity: $\dfrac{1 - \tan^2 x}{1 + \tan^2 x} + 1 = 2\cos^2 x.$

13. Verify the identity: $\dfrac{1 + \sin\theta}{1 - \sin\theta} = (\sec\theta + \tan\theta)^2.$

14. Find all real solutions to the equation: $\sqrt{3}\cot(2\theta) + 1 = 0$.

15. Find all real solutions to the equation: $2\sin^2\theta - 5\sin\theta + 3 = 0$.

16. Find all real solutions to the equation: $\cos(2\theta) = \cos\theta$.

17. Find the exact value of $\sin(75°)$.

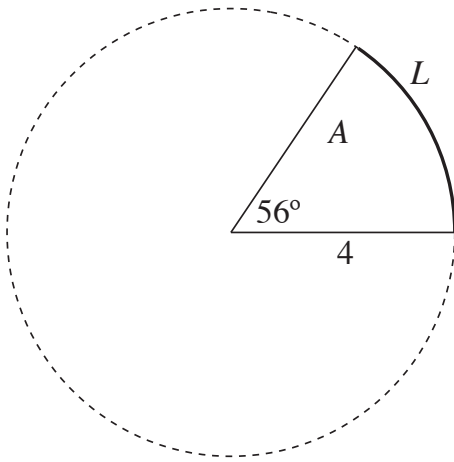18. Find the exact value of $\cos(22.5°)$

19. Verify the identity: $\dfrac{\cos(2\theta)}{1 + \sin(2\theta)} = \dfrac{\cot\theta - 1}{\cot\theta + 1}.$

Instructions: You may use a calculator for this portion of the test. Round answers to two decimal places.
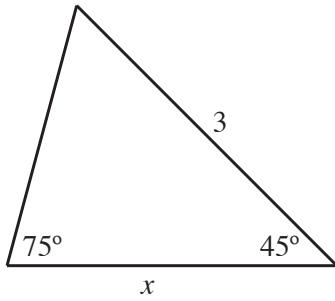
20. (a) Convert $4\pi/9$ radians to degrees.

    (b) Convert $150°$ to radians.

21. Find the length L of the arc shown in the illustration below. Find the area A of the sector.
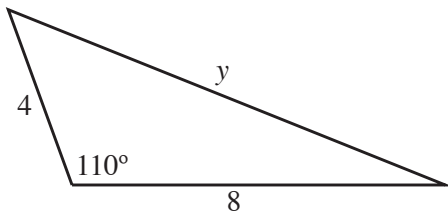

22. From a distance of 200 feet, measured along level ground, the angle of elevation to the top of a tower is $20°$. How tall is the tower?
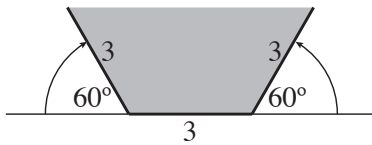
23. Find x.

24. Find y.

25. A rain gutter is made by folding up two sides of a flat sheet of metal as shown. What is the cross-sectional area of the gutter (the shaded area)?

I certify as a student at The University of Virginia's College at Wise that I have neither received nor given aid on this test.