This quiz is due at the **beginning of class on Moday, March 23**. No late assignments will be accepted. Since this is a take-home quiz, the standards are higher. Write neatly, staple your work, and present problems that in the same order as they are presented.

For full credit, show all steps, using correct notation. Unless otherwise indicated, present the exact value of all final answers.

1. (2 points) Graph $f(x) = \tan x$ on $[-2\pi, 2\pi]$. State the domain and range of the function.

2. (2 points each) Solve each of the following equations. Present your answer in radians.

    a) $\cos x + 1 = 2\sin^2 x$ b) $\cos 2x - \sin x = 1$ c) $\sin 3x = -\dfrac{1}{2}$ d) $\tan 5x = -1$

3. (2 points each) Compute the exact value of the following expressions. Make sure to simplify and rationalize all denominators.

    a) $\dfrac{\sin\left(\dfrac{11\pi}{3}\right) - \sec\left(\dfrac{11\pi}{4}\right)\cos\left(\dfrac{3\pi}{4}\right)}{\tan\left(\dfrac{13\pi}{6}\right) + \tan\left(\dfrac{11\pi}{3}\right)}$ b) $\tan 15°$

4. (2 points each) Given that α is an angle with $\cos\alpha = \dfrac{5}{13}$ and $180° < \alpha < 360°$, compute the exact value of each of the following.

    a) $\sin 2\alpha$ c) $\tan 2\alpha$ e) $\cos(90° - \alpha)$

    b) $\cos 2\alpha$ d) $\sin(\alpha - 45°)$ f) $\tan(\alpha + 45°)$

5. (2 points) A water storage tank has the shape of a cylinder with diameter 20 feet. It is placed so that the circular cross sections are vertical. If the depth of the water is 12 feet, what percentage of the total capacity is used?

6. (2 points) Find the length of the arc on a circle of radius 10 feet subtented by a $135°$ central angle.

7. (2 points) The propeller of an airplane has a radius of 3 feet. The propeller is rotating at 2250 revolutions per minute. Find the linear speed, in feet per second, of the tip of the propeller.

8. (2 points each) Prove each of the following identities.

    a) $\cos 4x = 1 - 8\sin^2 x \cos^2 x$ b) $\sin\left(x + \dfrac{\pi}{6}\right) - \cos\left(x + \dfrac{\pi}{3}\right) = \sqrt{3}\sin x$

9. (2 points) Consider the equation $\sin 4x = -\dfrac{\sqrt{3}}{2}$. Find all solutions of the equation such that $0 \le x \le 360°$. Present your answer in degrees.

10. (2 points) Solve the triangle $a = 7\,\text{cm}$, $b = 10\,\text{cm}$, and $\alpha = 20°$.