MTH 1000 Final Exam Practice

1. By completing the square, find the center and radius for the circle with the equation

$$x^2 + y^2 + 8x - 2y - 8 = 0$$

2. Find the equation of the line (in $y = mx + b$ form) that passes through the point $(-2, 2)$ and is
   (a) perpendicular to $4x - 2y = 8$.
   (b) parallel to $4x - 2y = 8$.

3. Solve the quadratic equations.
   (a) $x^2 + 2x - 35 = 0$
   (b) $(3x - 5)^2 + 1 = 2x$

4. State the domain for the functions in interval notation.
   (a) $f(x) = \frac{x+5}{x^2-4}$
   (b) $g(x) = \frac{\sqrt{3-x}}{x+6}$

5. Consider the piecewise function $f(x) = \begin{cases} 2, & \text{if } x < -2 \\ x^2, & \text{if } 2 \leq x \leq 2 \\ 2, & \text{if } x > 2 \end{cases}$.
   (a) Graph the f.
   (b) State the domain and range of f.
   (c) Is the function even, odd, or neither?

6. Find the domain, range, all intercepts, all asymptotes, and graph $f(x) = \frac{1}{x^2-4}$.

7. Let $f(x) = \frac{1}{x}$ and $g(x) = \sqrt{x}$. Find the formula, domain, and range for each of the following, if possible.
   (a) $(f \circ g)(x)$
   (b) $f^{-1}(x)$

8. Solve the exponential equations.
   (a) $2^{2x-1} = 4$
   (b) $5^{x^2+8} = 25^{3x}$

9. Solve each logarithmic equation.
   (a) $\log_5(x + 2) = 2$
   (b) $\log(x) + \log(x + 15) = 2$
   (c) $\log_3(x + 2) - 1 = -\log_3(x + 4)$
   (d) $\log_8(64)$

10. Convert the degree measurements into radians.
    (a) $70°$
    (b) $270°$

11. Fill in the table.

θ	$\sin\theta$	$\cos\theta$	$\csc\theta$
$0°$			
$30°$			
$45°$			
$60°$			
$90°$			
$180°$			
$270°$			
$360°$			

12. Find the exact value of the following trigonometric functions.
    (a) $\sin(300°)$ (b) $\tan(120°)$ (c) $\cos(135°)$
    (d) $\sin\left(\frac{3\pi}{4}\right)$ (e) $\tan\left(\frac{2\pi}{3}\right)$ (f) $\sec\left(\frac{-\pi}{4}\right)$

13. Determine the quadrant of each angle.
    (a) $\theta = 550°$ (b) $\theta = \frac{3\pi}{4}$

14. If $\sin\theta = \frac{\sqrt{2}}{2}$ and $\cos(\theta) > 0$, find the value of the other 5 trig functions at θ.

15. Find the period, amplitude, phase shift, x-intercepts, and y-intercepts of $f(x) = -2\sin\left(3x + \frac{\pi}{4}\right) - 2$, and then sketch at least two periods of the graph.

16. Evaluate the inverse trigonometric expressions.
    (a) $\cos^{-1}(1)$ (b) $\sin^{-1}(0)$
    (c) $\tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$ (d) $\cot^{-1}(-1)$

17. Evaluate if possible.
    (a) $\cos\left(\cos^{-1}\left(\frac{1}{2}\right)\right)$ (b) $\sin(\sin^{-1}(5))$

18. Evaluate the trigonometric expressions.
    (a) $\sin\left(\cos^{-1}\left(\frac{-\sqrt{2}}{2}\right)\right)$ (b) $\tan^{-1}\left(\cot\left(\frac{3\pi}{2}\right)\right)$

19. Find all the solutions in the interval $0 \leq \theta < 2\pi$.
    (a) $3\sqrt{2}\cos(\theta) + 2 = -1$ (b) $4\cos^2(\theta) - 3 = 0$

20. Evaluate the trigonometric expressions.
    (a) $\cos\left(\sin^{-1}\left(\frac{3}{5}\right) + \tan^{-1}\left(\frac{2}{3}\right)\right)$ (b) $\csc\left(\cot^{-1}\left(\frac{5}{3}\right)\right)$