# WORKSHEET # I

1. Write an equation for the following lines

   (a) Passes through $(-\sqrt{2}, 2)$ parallel to the line $2x + 5y = 15$

   (b) Passes through $(0, 1)$ and is perpendicular to the line $8x - 13y = 13$

2. Find the value of $c$ for the lines passing through the given points with the given slope.

   (a) $(-2, 4),\ (2c, 1),\ m = 1/2$ (b) $(-2, c^2),\ (1, c),\ m = 0$

   (c) $(c + 1, -2),\ (c^2 - 3c + 5, 5)$, no slope

3. Find the domain and range of the following functions

   a) $f(x) = \dfrac{1}{\sqrt{x^2 - 1}}$ d) $f(x) = \tan(2x - \pi)$

   b) $f(x) = 2^{1-x^2} + 1$ e) $f(x) = 1 + \cos(x + \pi)$

   c) $f(x) = \dfrac{1}{\ln^2(x + 1)}$ f) $f(x) = \cos^{-1}(\ln(x - 1))$

4. Compare the domain and the range of the functions $y = \sqrt{x^2}$ and $y = (\sqrt{x})^2$.

5. Graph the following functions bu using shifting and translation and state the domain and range of them

   (a) $y = e^{-x} - 1$ (c) $y = \sin(x + \frac{\pi}{2}) - 1$

   (b) $y = 1 - \log_3 x$ (d) $y = \cos^{-1}(x + 1) + \dfrac{\pi}{2}$

6. Let $f(x) = \ln\left(\dfrac{5x - x^2}{4}\right)$ and $g(x) = \sqrt{x}$. Find the domain and range of $(gof)(x)$.

7. Find $f^{-1}$ and verify that $(fof^{-1})(x) = (f^{-1}of)(x) = x$ for the following functions

   (a) $y = x^2 + 2x + 1,\ x \geq -1$ (b) $y = \dfrac{x + 5}{x - 3},\ x \neq 3$

8. Let $f$ be a 1-1 function with inverse $f^{-1}(x)$. Find the inverses of the following functions in terms of $f^{-1}(x)$

   a) $g(x) = 1 - 2f(3 - 4x)$ b) $g(x) = \dfrac{1 + f(x)}{1 - f(x)}$

9. Find the angles of the following.

(a) $\sin^{-1}(\frac{1}{2})$

(b) $\sin^{-1}(-\frac{1}{2})$

(c) $\cos^{-1}(\frac{1}{\sqrt{2}})$

(d) $\cos^{-1}(-\frac{1}{\sqrt{2}})$

(e) $\tan^{-1}(\infty)$

(f) $\tan^{-1}(-\infty)$

10. Evaluate the following expressions

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

b) $\sin(\tan^{-1} \frac{x}{\sqrt{x^2+1}})$

11. Prove the following identities.

(a) $\sec^{-1}(-x) + \sec^{-1} x = \pi$

(b) $\cos^{-1} x + \cos^{-1}(-x) = \pi$

(c) $\cot^{-1} \frac{1}{x} - \tan^{-1} x = \pi, \ x < 0$

(d) $\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right) - \sin^{-1} x = 0$

12. Find the value of the following

$$\tan^{-1}(\tan(\frac{3\pi}{4})) + \sin^{-1}(\sin(\frac{\pi}{4})) + \sin(\cos^{-1}(\frac{3}{5}))$$

13. Identify the particle's path by finding a Cartesian equation for it. Graph the Cartesian equation.

(a) $x = \sec^2 t - 1, \quad y = \tan t, \quad -\pi/2 < t < \pi/2$

(b) $x = 4\cos t, \quad y = 2\sin t, \quad 0 \le t \le \pi$

(c) $x = 4\cos t, \quad y = 2\sin t, \quad -\pi/2 \le t \le \pi/2$

(d) $x = 2t + 3, \quad y = t^2 - 1, \quad -2 \le t \le 2$

14. Find parametrizations for

(a) the line segment with the end points $(-1, 3)$, $(2, 3)$

(b) the upper half of the parabola $x - 1 = y^2$

(c) the ray (half line) with the initial point $(-1, 2)$ that passes through the point $(0, 0)$