SATPREP **Name** ______________________________

Assignment Domain and Range of function **Date** ________________

1. The function f is given by $f(x) = \sqrt{\ln(x-2)}$. Find the domain of the function.

2. The function f is defined for $x \le 0$ by $f(x) = \dfrac{x^2-1}{x^2+1}$. Find an expression for $f^{-1}(x)$.

3. Find the largest domain for the function $f : x \mapsto \dfrac{1}{\sqrt{4-9x^2}}$.

4. Consider the function $f : x \mapsto \sqrt{x+1},\ x \ge -1$

(a) Determine the inverse function f^{-1}.

(b) What is the domain of f^{-1}?

5. The one-one function f is defined on the domain $x > 0$ by $f(x) = \dfrac{2x-1}{x+2}$.

(a) State the range, A, of f.

(b) Obtain an expression for $f^{-1}(x)$, for $x \in A$.

6. Let $f : x \mapsto \sqrt{\dfrac{1}{x^2} - 2}$. Find

(a) the set of real values of x for which f is real and finite;

(b) the range of f.

7. The function $f : x \mapsto \dfrac{2x+1}{x-1},\ x \in \mathbb{R}, x \ne 1$. Find the inverse function, f^{-1}, clearly stating its domain.

8. (a) Find the largest set S of values of x such that the function $f(x) = \dfrac{1}{\sqrt{3-x^2}}$ takes real values.

(b) Find the range of the function f defined on the domain S.

Answer to Assignment: Domain and Range of function

1. $x \geq 3$

2. $f^{-1}(x) = -\sqrt{\dfrac{1+x}{1-x}}$ (A1)

3. Domain = $\left\{x : -\dfrac{2}{3} < x < \dfrac{2}{3}\right\}$ **OR** $\left\{x : |x| < \dfrac{2}{3}\right\}$

4. (a) $f^{-1}(x) = x^2 - 1$ (or $y = x^2 - 1$)

(b) Domain of $f^{-1}(x)$ = range of $f(x) \Rightarrow x > 0$

5. (a) A = $\left]-\dfrac{1}{2}, 2\right[$

(b) $f^{-1}(x) = \dfrac{1+2x}{2-x}$

6. (a) $-\dfrac{1}{\sqrt{2}} \leq x \leq \dfrac{1}{\sqrt{2}}$, $x \neq 0$

(b) $y \geq 0$

7. $f^{-1} : x \mapsto \dfrac{x+1}{x-2}$,
Domain $x \in \mathbb{R}$, $x \neq 2$

8. (a) $-\sqrt{3} \leq x \leq \sqrt{3}$ *or* $\left[-\sqrt{3}, \sqrt{3}\right]$

(b) A sketch of $f(x)$ over this interval is

$\dfrac{1}{\sqrt{3}} \leq f(x) < \infty$, or $f(x) \geq \dfrac{1}{\sqrt{3}}$, or $f(x) \geq 0.577$.