Test 1 - Review

Question 1. Let the set **English** be the entire English dictionary, and the set **Arabic** be the entire Arabic dictionary. Lets define the following function,

$$f\colon \textbf{English} \to \textbf{Arabic}$$
$$f(\text{English Word}) = \text{Arabic Word}.$$

(a) Determine $f(\text{door})$.

(b) Determine $f(\text{tall})$.

(c) Determine $f(\text{books})$.

(d) Determine $f(\text{short})$.

Question 2. Determine the elements of the following sets, (Reacll that $\mathbb{N} = \{1, 2, 3, 4, 5, \dots\}$).

(a) $H = \{n \in \mathbb{N} \mid n \geq 4\}$

(b) $R = \{y \in \mathbb{Z} \mid -2 < y \leq 4\}$

(c) $A = \{r \in \mathbb{Z} \mid r^2 - 4 = 0\}$

Question 3. Let $\mathcal{V} = \{3, 4, 5, 6, 8, 10\}$, and $\mathcal{W} = \{0, 1, 2, 3, 4, 5\}$. Define the following function,

$$R\colon \mathcal{V} \to \mathcal{W}$$
$$R(v) = \gcd(2v, \text{rem}(v, 3)).$$

Draw a mapping diagram of the function. (**Note:** $\gcd(x, 0) = x$).

Question 4. Let $T(x) = 3x^2 + 4x$, and $H(x) = x - 1$.

(a) Determine $T(T(1))$.

(b) Determine $H(H(-2))$.

(c) Determine $T(H(0))$.

(d) Factor $T(x)$. **(This should take one step)**

(e) Factor $T(H(x))$. ***** **Test Question**

Question 5. Determine the Domain and Range of the following functions,

(a) $\mathcal{T}(x) = -\sqrt{-4x + 8} - 7$.

(b) $F(x) = -x^2 + 2x + 5$.

(c) $L(x) = -2x + 1$.

(d) $\mathcal{P}(x) = 2|-x + 1| - 5$.

(e) $\mathcal{P}(x) = -\frac{3}{5x-2} + 4$.

(f) $(x + 1)^2 + y^2 = 4$.

Question 6. Let $f(x) = 2x^2 + 5x - 3$.

(a) How many solutions will $f(x)$ have?

(b) Factor $f(x)$.

(c) State the x-intercepts of $f(x)$.

(d) Convert $f(x)$ from factored form to vertex form.

(e) Using your function in vertex form, sketch it **(Label the y-intercept, x-intercepts and the vertex**).