Ex-2. 1) $A(x) = (2x-1)(x+1) - x^2 + x - 2$

Part-A:

$= 2x^2 + x - 1 - x^2 + x - 2$

$\boxed{A(x) = x^2 + 2x - 3}$

2) $A(x) + 4 = x^2 + 2x - 3 + 4$

$= x^2 + 2x + 1$

$= (x)^2 + 2(x)(1) + (1)^2$

$= (x+1)^2$ (which is a square of a binomial)

3) $A(x) + 4 = (x+1)^2$

So, $A(x) = (x+1)^2 - 4$

$= (x+1)^2 - 2^2$

$= (x+1-2)(x+1+2)$

Thus, $\boxed{A(x) = (x-1)(x+3)}$

4) $B(x) = (x+3)(x-2) + 2x(x+3)$

$= (x+3)[x-2+2x)$

Thus, $\boxed{B(x) = (x+3)(3x-2)}$

5) a) $F(x) = \dfrac{A(x)}{B(x)}$

$F(x)$ is defined if $B(x) \neq 0$

So, $(x+3)(3x-2) \neq 0$

means, $x \neq -3$ & $x \neq \frac{2}{3}$

Thus, $F(x)$ is defined for real values of x except $x = -3$ & $x = \frac{2}{3}$

b) $F(x) = \dfrac{(x-1)(x+3)}{(x+3)(3x-2)}$

Thus, $\boxed{F(x) = \dfrac{x-1}{3x-2}}$

$F(\sqrt{2}) = \dfrac{(\sqrt{2}-1)\times(3\sqrt{2}+2)}{(3\sqrt{2}-2)(3\sqrt{2}+2)}$

$= \dfrac{3\times 2 - \sqrt{2} - 2}{(3\sqrt{2})^2 - (2)^2}$

Thus, $\boxed{F(\sqrt{2}) = \dfrac{4-\sqrt{2}}{14}}$

Part-B:

1) Area of shaded domain $= Area_{ABCD} - (A_{AFE} + A_{FBG} + A_{GCH} + A_{HDE})$

but $A_{ABCD} = side^2 = AB^2 = 36$

$A_{AFE} = \dfrac{base \times height}{2} = \dfrac{AF \times AE}{2} = \dfrac{x(6-x)}{2}$.

$A_{FBG} = \dfrac{leg_1 \times leg_2}{2} = \dfrac{FB \times BG}{2} = \dfrac{x(1)}{2}$.

$A_{GCH} = \dfrac{b \times h}{2} = \dfrac{CG \times CH}{2} = \dfrac{5(6-x)}{2}$.

$A_{HDE} = A_{AFE} = \dfrac{x(6-x)}{2}$.