**01.** ①, ④

02. (a) $x \neq \pm 2$인 모든 실수　　　(b) $\left\{ x \in \mathbb{R} \,|\, 0 \leq x \leq \dfrac{25}{2} \right\}$

03.
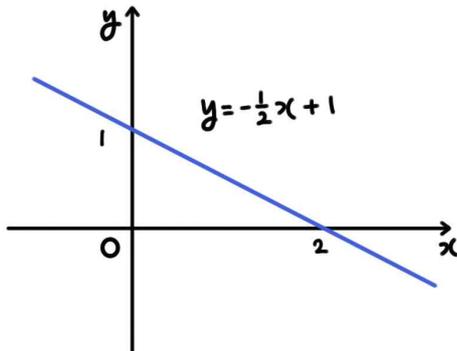
(a)　　　　　　　　　　　　　　　　　　(b)
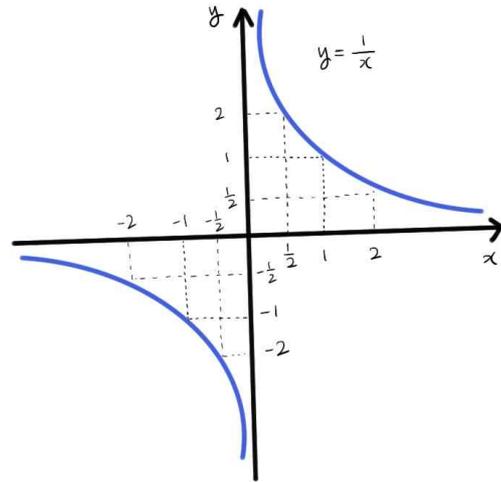
04.

① $f + g = \left(x^3 + x^2 \right) + \left(2x^2 - 3 \right) = x^3 + 3x^2 - 3$, 정의역 : 모든 실수

② $f - g = \left(x^3 + x^2 \right) - \left(2x^2 - 3 \right) = x^3 - x^2 + 3$, 정의역 : 모든 실수

③ $fg = \left(x^3 + x^2 \right)\left(2x^2 - 3 \right) = 2x^5 + 2x^4 - 3x^3 - 3x^2$, 정의역 : 모든 실수

④ $\dfrac{f}{g} = \dfrac{x^3 + x^2}{2x^2 - 3}$, 정의역 : $\left\{ x \in \mathbb{R} \,|\, 2x^2 - 3 \neq 0 \right\} = \left\{ x \in \mathbb{R} \,|\, x \neq \pm \dfrac{\sqrt{6}}{2} \right\}$

05. (a) $y = -x^2 + 4x - 4$　　　　(b) $y = -\sqrt{-2x - 3}$

01. (거짓)

02. $(g \circ f)(1) = 12$

03. $(f \circ g)(x) = x + 7$ (단, $x \geq -3$)

04. $f^2(x) = 8x^4 + 40x^2 + 55$

05. $a = -1$

01. (참)

02. 함수 f 는 전단사함수이다.

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

04. $f^{-1}(1) = 0$

05. $(-1, -1)$

1장 연습문제

01. ③

02. $g(1) = -2$

03. $A = \{1, 2, 4\}$

04.

(a)

(b)
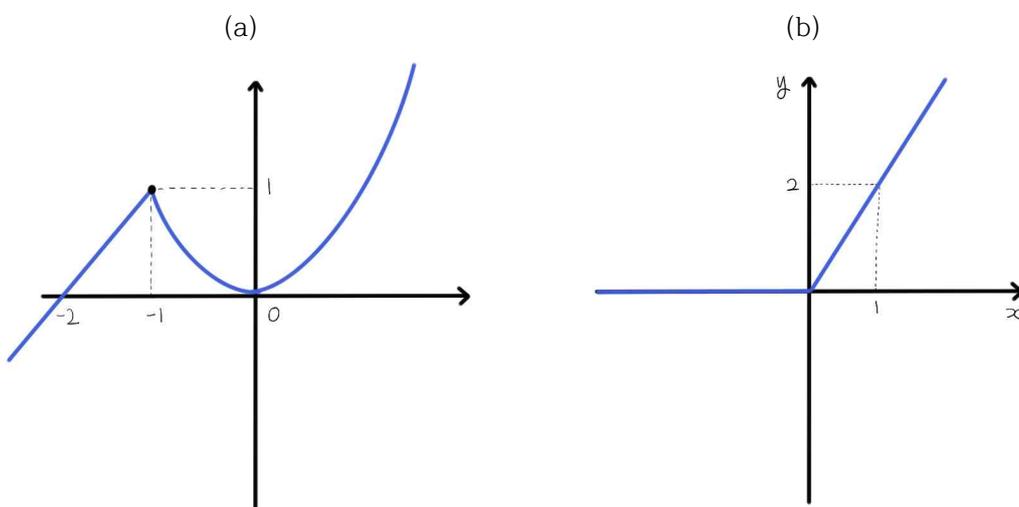

```python
import numpy as np
import matplotlib.pyplot as plt

# (a) f(x)=x+2 (x<=-1), x^2 (x>-1)
x  = np.linspace(-2,2,401)
fx = np.zeros_like(x)
for i in range(0,401):
    if x[i] <= -1:
        fx[i] = x[i]+2
    elif x[i] > -1:
        fx[i] = x[i]**2
plt.plot(x,fx)
plt.show()

# (b) g(x) = x+|x|
x = np.linspace(-2,2,401)
gx = x+np.abs(x)
plt.plot(x,gx)
plt.show()
```

05.
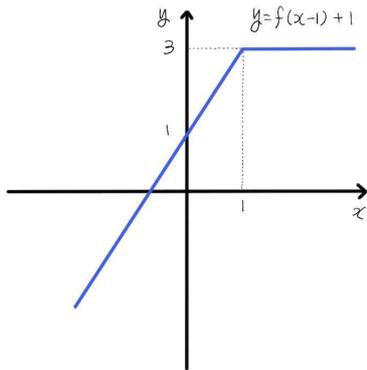
(a)   (b)
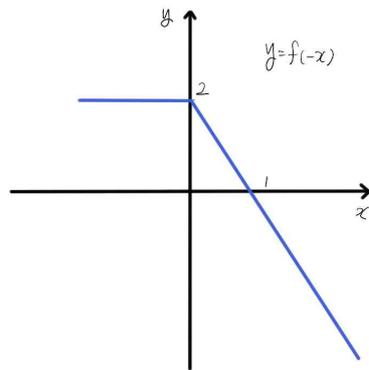
06. $f(3) = 5$

07. (a) $h(x) = \dfrac{1}{3}x^2 - 1$ (b) $h(t) = \dfrac{1}{9}\left(t^2 - 8t + 25\right)$

08. (a) h 는 짝함수이다.

  (b) f^2 은 홀함수이다.

  (c) 짝함수의 예: $g(x) = x^2$, 홀함수의 예: $f(x) = x^3$

```
import numpy as np
import matplotlib.pyplot as plt

# (a) g(x)=x^2
x = np.linspace(-5,5,1001)
gx = x**2+1
plt.plot(x,gx)
plt.show()

# (b) f(x) = x^3
x = np.linspace(1,10,901)
fx = x**3
plt.plot(x,fx)
plt.show()
```

09. 생략

10. ②, ③

11. 생략

12. (a) $f^{-1}(x) = \dfrac{1}{2}\left(x^2 - 6x + 8\right)$ $(x \geq 3)$ (b) $f^{-1}(x) = -\dfrac{1}{2} + \dfrac{1}{x+1}$ $(x \neq -1)$

```python
import numpy as np
import matplotlib.pyplot as plt

# (a) f^{-1}(x)=0.5*(x^2-6*x+8)
x = np.linspace(3,7,401)
f_inv = 0.5*(x**2-6*x+8)
plt.plot(x,f_inv)
plt.show()

# (b) f^{-1}(x) = -0.5+1/(x+1)
x_left = np.linspace(-5,-1.01,401) # x=-1에서의 계산을 피하기 위한 방법
f_inv_left = -0.5+1/(x_left+1)
x_right = np.linspace(-0.99,3,401) # x=-1에서의 계산을 피하기 위한 방법
f_inv_right = -0.5+1/(x_right+1)
plt.plot(x_left,f_inv_left,x_right,f_inv_right)
plt.show()
```

13. $x = \dfrac{9}{2}$

14. $(-1, -1)$