For the given functions: $h(x) = 2x + 1$ and $k(x) = 4x$ answer questions 1 and 2

~~1)~~ $h(k(x))$

~~2)~~ $k(h(-2))$

3) Find g^{-1}, the inverse of $g(x)$, if $g(x) = 2x - 1$

$$y = 2x - 1 \longrightarrow x = 2y - \cancel{1}$$
$$\underline{+1}$$
$$\frac{x+1}{2} = \frac{\cancel{2}y}{\cancel{2}} \longrightarrow g^{-1}(x) = \frac{x+1}{2}$$

4) Evaluate: $\left(\frac{1}{2}\right)^3\left(\frac{1}{4}\right)^{-3}$

$$\left(\tfrac{1}{8}\right)(64) = 8$$

5) Simplify: $\dfrac{25a^3b^{-4}c^{-2}}{30a^5b^6c^3}$ $= \dfrac{5}{6a^2b^{10}c^5}$

6) Given $f:\{(-1,3)\,(2,4)\,(4,1)\,(0,3)\}$, which is true $f^{-1}\{(3,-1)\,(4,2)\,(1,4)\,(3,0)\}$

~~(1) Both f and f^{-1} are functions~~
~~(2) Neither f nor f^{-1} are functions~~
(3) Only f is a function
~~(4) Only f^{-1} is a function~~

* every x goes to one y

* not function if x's repeat

7) Evaluate the following function $f(x) = -4x^2 - 3x + 1$ for $f(-4)$

$\leftarrow$ **plug in for X**

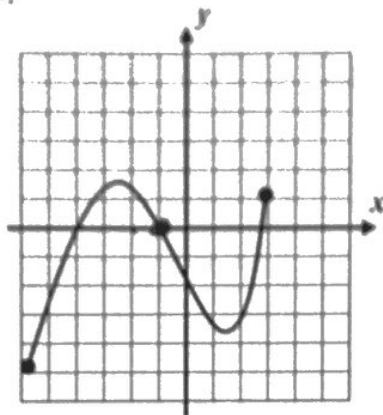$$f(-4) = -4(-4)^2 - 3(-4) + 1$$
$$= -4(16) + 12 + 1 = -51$$

8) The expression $4a^{-2}$ is equivalent to

(1) $\frac{4}{a^2}$ (2) $\frac{1}{4a^2}$ (3) $\frac{1}{16a^2}$ (4) $\frac{1}{8a^2}$

9) Find f^{-1}, the inverse of $f(x)$, if $f(x) = 5x - 1$

$$y = 5x - 1 \rightarrow x = 5y - 1$$

$$\frac{x+1}{5} = \frac{5y}{5} \rightarrow f^{-1}(x) = \frac{x+1}{5}$$

Given the following graph,

a. express the domain and range using interval notation

$D: -6 \leq x \leq 3$

$R: -5 \leq y \leq 1.5$

b. Find $f(-1) = 0$

when $x = -1$, $y = 0$

✱10) Solve the system of equations

$$2x + y = 1$$
$$y = x^2 - 4x + 6$$

and express the roots in simplest $a + bi$ form

$$2x + x^2 - 4x + 6 = 1$$
$$x^2 - 2x + 6 = 1$$
$$x^2 - 2x + 5 = 0$$

$a = 1$
$b = -2$
$c = 5$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(5)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{-5}}{2} = \frac{2 \pm i\sqrt{5}}{2}$$

$$2\left(\frac{2 + i\sqrt{5}}{2}\right) + y = 1 \quad \left(\frac{2 + i\sqrt{5}}{2}, -1 - i\sqrt{5}\right)$$

$$2 + i\sqrt{5} + y = 1$$
$$y = -1 - i\sqrt{5} \quad \left(\frac{2 - i\sqrt{5}}{2}, -1 + i\sqrt{5}\right)$$

plug in for x

1) Evaluate the function for the value of x: $f(x) = 3x^2 - 2x + 1$, $f(-4)$

$$f(-4) = 3(-4)^2 - 2(-4) + 1$$
$$= 3(16) + 8 + 1 = 57$$

~~2)~~ Find f^{-1}, the inverse of $f(x)$, if $f(x) = 5x - 1$

~~3)~~ For the given functions: $f(x) = x + 3$ and $g(x) = 4x$ answer the following question

a) $(f \circ g)(x)$ b) $(g \circ f)(x)$ c) $(f \circ g)(-2)$

4) Solve algebraically:

a) $y + 4 = 2x$ $(-3, -10)$ b) $y - x = 2$ $(2, 4)$

   $y = x^2 + 3x - 10$ $(2, 0)$ $y = x^2 - 2x + 4$ $(1, 3)$

5) Using matrices, setup and solve: $x - y = 1$
                                        $x + 2y = 7$

$$\rightarrow \begin{bmatrix} 1 & -1 & : & 1 \\ 1 & 2 & : & 7 \end{bmatrix} \textcircled{1}$$

$\text{Det} = (1)(-1) - (1)(2)$
$= -1 - 2 = -3$

$$\textcircled{2} \quad x = \frac{\begin{vmatrix} 1 & -1 \\ 7 & 2 \end{vmatrix}}{-3} = \frac{(1)(2) - (7)(-1)}{-3} = \frac{2+7}{-3} = -3 \quad \textcircled{3} \quad y = \frac{\begin{vmatrix} 1 & 1 \\ 1 & 7 \end{vmatrix}}{-3} = \frac{(1)(7) - (1)(1)}{-3} = -2$$

6) Divide using synthetic division: $1x^3 + 9x^2 + 23x + 15$; $x + 5$ → $X = -5$ $\boxed{(-3, -2)}$

$$\begin{array}{r|rrrr} -5 & 1 & 9 & 23 & 15 \\ & \downarrow & -5 & -20 & -15 \\ \hline & 1 & 4 & 3 & 0 \end{array}$$

$$x^2 + 4x + 3$$

7) Combine: $\begin{bmatrix} 9 & -3 \\ 4 & 1 \end{bmatrix} + \begin{bmatrix} 5 & 2 \\ -1 & 6 \end{bmatrix} + \begin{bmatrix} 1 & 3 \\ 3 & -2 \end{bmatrix} = \begin{bmatrix} 15 & 2 \\ 6 & -2 \end{bmatrix}$

4) a) $y + 4 = 2x$

$y = x^2 + 3x - 10$

$x^2 + 3x - 10 + 4 = 2x$

$x^2 + 3x - 6 = 2x$

$x^2 + x - 6 = 0$

$$\frac{(x+3)|(x-2) = 0}{x = -3 \mid x = 2}$$

$y + 4 = 2(-3)$ $y + 4 = 2(2)$

$y + 4 = -6$ $y + 4 = 4$ ●

$y = -10$ $y = 0$

$(-3, -10)$ & $(2, 0)$

4) b) $y - x = 2$

$y = x^2 - 2x + 4$

$x^2 - 2x + 4 - x = 2$

$x^2 - 3x + 2 = 0$

$$\frac{(x-2)(x-1) = 0}{x = 2 \mid x = 1}$$

$y - 2 = 2$ $y - 1 = 2$

$y = 4$ $y = 3$

$(2, 4)$ & $(1, 3)$

8) Solve for x. $64^{x+2} = 4^x$

$(4^3)^{x+2} = 4^x$

$3x + 6 = x$

$2x = -6$

$x = -3$

9) Describe the end behavior for the following function:

$f(x) = 4x^3 - 5x^2 + 2x^5 - 8x + 4$

odd + positive   ↓ ↑

as $x \to \infty$, $f(x) \to \infty$

as $x \to -\infty$, $f(x) \to -\infty$

10) The function f(x) is fully defined by the graph. Evaluate f(-2) = 2