

**King Fahd University of Petroleum and Minerals**  
**Mathematical Sciences Department**

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**Show All Necessary Steps**

(1) If  $f(x) = \begin{cases} 3x - 1 & , \text{ if } x \leq -1 \\ 2x + 1 & , \text{ if } x > -1 \end{cases}$ , and  $g(x) = \lfloor 2x + 1 \rfloor$ , then the value of

$$(f \circ g)(-\sqrt{2}) + \sqrt{(f \cdot g)(0.5)} =$$

- a) -2
- b) -3
- c) -5
- d) 5
- e) 0

(2) Given  $f(x) = \sqrt{25 - x^2}$  and  $g(x) = x - 3$ , then the domain of  $\frac{f}{g}$  is:

- a)  $[-5, 5]$
- b)  $(-\infty, 5] \cup [5, \infty)$
- c)  $(-\infty, \infty)$
- d)  $[-5, 3) \cup (3, 5]$
- e)  $(-\infty, 3) \cup (3, \infty)$

(3) If  $f(x) = (x - 3)^2$  with domain  $(-\infty, 3]$ , then  $f^{-1}(x)$

- a)  $= 3 - \sqrt{x}$
- b)  $= 3 + \sqrt{x}$
- c)  $= 3 \pm \sqrt{x}$
- d)  $= 3 + x^2$
- e) does not exist

(4) For  $f(x) = x^2 + 3x - 1$ , the difference quotient  $\frac{f(x+h) - f(x)}{h} =$

- a)  $2x + 3$
- b)  $2x + h + 3$
- c)  $2 - x + h$
- d)  $2x$
- e)  $-3$

(5) Let  $f(x) = x^2 + 1$  with domain  $(-\infty, 0]$ . The value of  $f^{-1}(26)$

- a)  $= 5$
- b)  $= \pm 5$
- c)  $= -5$
- d)  $= -4$
- e) does not exist

(6) Which one of the following functions is NOT an even function?

a)  $g(x) = |x| + 2$

b)  $h(x) = 1$

c)  $s(x) = 16x^2 + x$

d)  $w(x) = \sqrt{3 - x^2}$

e)  $k(x) = 4 + x^4$

(7) If a function  $y = f(x)$  has domain  $(-2, 4]$  and range  $(-3, 4)$ , then the function

$y = -2f\left(\frac{1}{3}x\right)$  has:

a) *domain*  $= (-\infty, \infty)$  and *range*  $= (-\infty, \infty)$

b) *domain*  $= (-6, 12]$  and *range*  $= (-3, 4)$

c) *domain*  $= (-2, 4)$  and *range*  $= (-8, 6)$

d) *domain*  $= (-2, 4)$  and *range*  $= (-3, 4)$

e) *domain*  $= (-6, 12]$  and *range*  $= (-8, 6)$

(8) If  $f(x) = x^3 + x$ , then  $(f \circ f^{-1})(-2) =$

a) 5

b) -5

c) -10

d) -4

e) -3