Practice Test 2

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MC

1

$\boxed{y = \sqrt{x}} \longrightarrow \boxed{y = -\sqrt{x+5}}$

original — Transformed

Recall: $y = f(x)$ (original function); c : positive number

$y = f(x+c)$: Left c units

$y = f(x-c)$: Right c units

$y = -f(x)$: Reflect across x-axis

In this case: left 5 units | Reflect across x-axis

$\sqrt{x+5}$ | $-\sqrt{x+5}$

Answer: C.

2

$\boxed{y = f(x)}$ $\boxed{y = f(x-1) + 3}$

original — transformed

Right 1 , up 3

x	$y = f(x)$
4	13

$(4,13) \xrightarrow[\text{Right } 1]{} (5,13) \longrightarrow (5,16)$

add 1 to x-coord. add 3 to y-coord.

Answer: A.

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(3) Original graph: $y = -x^3 + 3x$

Transformed graph: Down by 2 units (from picture)

Formula for transformed graph $y = -x^3 + 3x - 2$

Answer: D.

(4) Domain of $h(x) = \dfrac{x-2}{x^3 - 36x}$

To find domain: Set Denominator = 0 and solve for x.

$x^3 - 36x = 0$

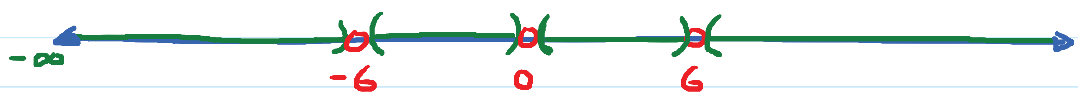
$x(x^2 - 36) = 0$ (Factor out x)

$x = 0$ or $x^2 - 36 = 0$ (Set each factor $= 0$)

$x^2 = 36$

$x = \pm\sqrt{36} = \pm 6$

Domain: All real numbers except for 0, 6, −6



In interval notation: $D = (-\infty, -6) \cup (-6, 0) \cup (0, 6) \cup (6, \infty)$

Answer: C

5) Find $(f-g)(1)$; $f(x) = 2x^2+6$; $g(x) = x+7$

$(f-g)(x) = f(x) - g(x)$

$= 2x^2 + 6 - (x+7)$

$= 2x^2 + 6 - x - 7$

$(f-g)(x) = 2x^2 - x - 1$

$(f-g)(1) = 2(1)^2 - (1) - 1 = \boxed{0}$

Answer: D.

<u>2nd way to solve:</u>

$f(1) = 2(1)^2 + 6 = 8$

$g(1) = (1) + 7 = 8$

$(f-g)(1) = f(1) - g(1) = 8 - 8 = \boxed{0}$

6) $f(x) = 9x - 3$; $g(x) = 3x + 4$

$(fg)(x) = f(x) \cdot g(x)$

$= (9x-3)(3x+4)$

$= 27x^2 + 36x - 9x - 12$

$= \boxed{27x^2 + 27x - 12}$

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7. $f(x) = \sqrt{6-x}$; $g(x) = \sqrt{x-2}$

Process for finding domain of fg (or $f+g$ or $f-g$)

Step 1: Find domain of f, D_f.

Find domain of g, D_g.

Step 2: Find $D_f \cap D_g$ (intersection)

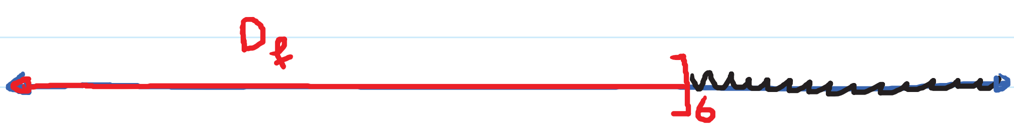
Here:

Step 1: Domain of $f(x) = \sqrt{6-x}$

Set $6 - x \geq 0 \rightarrow -x \geq -6$

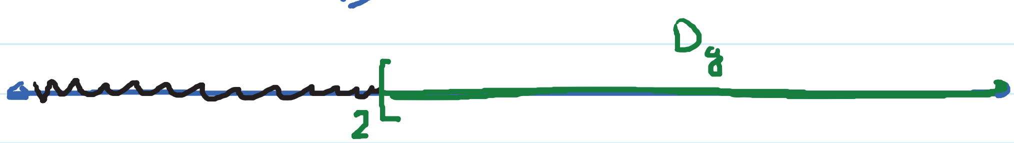
$\rightarrow x \leq \frac{-6}{-1} = 6$ (Divide by -1 ; flip direction)

$\rightarrow x \leq 6$

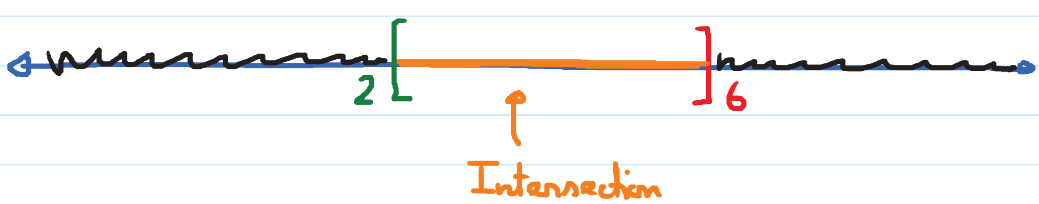


Domain of $g(x) = \sqrt{x-2}$

Set $x - 2 \geq 0 \rightarrow x \geq 2$



Step 2: Intersection.



Conclusion: Domain of $fg = [2,6]$. Answer: A.

8) $f(x) = -2x + 5$; $g(x) = 3x + 2$

$(g \circ f)(x) = g(f(x)) = g(-2x+5)$

$= 3(-2x+5) + 2$

$= -6x + 15 + 2$

$(g \circ f)(x) = -6x + 17$

Answer: C.

9) $(f \circ g)(-2)$ when $f(x) = -2x - 5$

$g(x) = -4x^2 - 7x - 9.$

First plug -2 into g, simplify, then plug result into f.

$g(-2) = -4(-2)^2 - 7(-2) - 9 = -11$

$f(-11) = -2(-11) - 5 = 22 - 5 = \boxed{17}$

Answer: C.

10) $f(x) = (x-5)^3$

$y = (x-5)^3$ (Replace $f(x)$ with y)

$x = (y-5)^3$ (Interchange x and y)

$\sqrt[3]{x} = \sqrt[\cancel{3}]{(y-5)^{\cancel{3}}} \rightarrow \sqrt[3]{x} = y - 5$

$\rightarrow \sqrt[3]{x} + 5 = y \rightarrow y = \sqrt[3]{x} + 5 \rightarrow \boxed{f^{-1}(x) = \sqrt[3]{x} + 5}$

Choice A