Practice Test 1 (Test 1 Review)

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#1 $(3x+5)^2 = 5$

Square Root Property:

$\sqrt{(3x+5)^2} = \pm\sqrt{5}$

$3x+5 = \pm\sqrt{5}$

$3x = \pm\sqrt{5} - 5$ (Subtract 5 from both sides)

$3x = -5 \pm \sqrt{5}$ (Rewrite)

$x = \dfrac{-5 \pm \sqrt{5}}{3}$ (Divide both sides by 3)

Solution set: $\left\{ \dfrac{-5-\sqrt{5}}{3} ; \dfrac{-5+\sqrt{5}}{3} \right\}$ Ans: B.

#2 $4x^2 = -6x - 1$

$4x^2 + 6x + 1 = 0$ (Rewrite it in standard form $ax^2 + bx + c = 0$)

$a = 4$; $b = 6$; $c = 1$.

Quadratic Formula: $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \dfrac{-6 \pm \sqrt{(6)^2 - 4(4)(1)}}{2(4)} = \dfrac{-6 \pm \sqrt{36-16}}{8}$

$= \dfrac{-6 \pm \sqrt{20}}{8} = \dfrac{-6 \pm \sqrt{4}\cdot\sqrt{5}}{8} = \dfrac{-6 \pm 2\sqrt{5}}{8}$

$$x = \frac{2(-3 \pm \sqrt{5})}{8\ 4} = \frac{-3 \pm \sqrt{5}}{4}$$

Solution set: $\left\{ \frac{-3-\sqrt{5}}{4} ; \frac{-3+\sqrt{5}}{4} \right\}$ Ans: D

#3

$4x^2 + 52 = 0$

$4x^2 = -52$ (Subtract 52 from both sides)

$x^2 = -13$ (Divide by 4)

$x = \pm\sqrt{-13}$ (Square Root Property)

$x = \pm\sqrt{i^2 \cdot 13}$ (Imaginary number)

$x = \pm i\sqrt{13}$

Solution set: $\left\{ i\sqrt{13} ; -i\sqrt{13} \right\}$ Ans: C.

#4

$5x^3 + 3x^2 = 80x + 48$

$5x^3 + 3x^2 - 80x - 48 = 0$ (Make RHS = 0)

$x^2(5x+3) - 16(5x+3) = 0$ (Factor by grouping)

$(5x+3)(x^2-16) = 0$ (Factor out the common factor)

$5x + 3 = 0$ or $x^2 - 16 = 0$ (Set each factor = 0)

$x^2 = 16$

$x = -\frac{3}{5}$ $x = \pm\sqrt{16} = \pm 4$

Solution set: $\left\{-\frac{3}{5}, -4, 4\right\}$ Ans: C

#5

$$\sqrt{8x+20} = x$$

$$\left(\sqrt{8x+20}\right)^2 = x^2 \quad \text{(Square both sides)}$$

$$8x + 20 = x^2$$

$$0 = x^2 - 8x - 20$$

$$0 = (x-10)(x+2) \quad \text{(Factor)}$$

$$x - 10 = 0 \quad \text{or} \quad x + 2 = 0$$

$$x = 10 \quad ; \quad x = -2$$

Check: For $x = 10$: $\sqrt{8(10)+20} = 10$

Solution

$\sqrt{100} = 10$ True. ✓

For $x = -2$: $\sqrt{8(-2)+20} = -2$

Not a solution

$\sqrt{4} = -2$

$2 = -2$ False.

Solution set: $\{10\}$ Ans: D.

#6 $(\overbrace{3x-7}^{u})^2 - 4(\overbrace{3x-7}^{u}) - 12 = 0$

Let $u = 3x - 7$

Rewrite as an equation in u:

$$u^2 - 4u - 12 = 0$$

$$(u - 6)(u + 2) = 0$$

$u - 6 = 0$ or $u + 2 = 0$

$u = 6$; $u = -2$.

When $u = 6$: $6 = 3x - 7$

$\rightarrow 13 = x \rightarrow \boxed{x = \frac{13}{3}}$

When $u = -2$: $-2 = 3x - 7$

$\rightarrow 5 = 3x \rightarrow \boxed{x = \frac{5}{3}}$

Solution set: $\boxed{\left\{\frac{13}{3}, \frac{5}{3}\right\}}$ Ans: A.

#7

$\{(-3,-8); (3,6); (5,-5); (7,-6); (10,6)\}$

None of the x-values repeats.

This is a Function. Ans: B.

#8 $f(x) = x^2 - 5x + 1$

Find $f(-3)$.

$f(-3) = (-3)^2 - 5(-3) + 1$

$= 9 + 15 + 1 = \boxed{25}$

Ans: A.

#9 $f(x) = 3x^2 - 4x + 2$. Find $f(x-1)$

$f(x-1) = 3(x-1)^2 - 4(x-1) + 2$

$= 3(x-1)(x-1) - 4x + 4 + 2$

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

$= 3(x^2 - 2x + 1) - 4x + 6$

$= 3x^2 \boxed{- 6x} \boxed{+ 3} \boxed{- 4x} \boxed{+ 6}$

$f(x-1) = \boxed{3x^2 - 10x + 9}$ (Combine like terms)

Ans: D

#10

Domain: x-axis : $[-3, 0]$ (leftmost to Rightmost)

Range: y-axis : $[-4, 0]$ (Lowest to Highest)

Ans: B.

#11

$$f(x) = \begin{cases} x-5 & \text{if } x > 3 \\ -(x-5) & \text{if } x \leq 3. \end{cases}$$

$f(3)$ → equal to 3 → second formula

$$f(3) = -(3-5) = -(-2) = \boxed{2}$$

Ans: C

#12

Vertical line test: this is a function of y as a function of x.

Ans: A.

#13

$$x^2 + 9x - 36 = 0$$

$$(x+12)(x-3) = 0$$

$$x + 12 = 0 \quad ; \quad x - 3 = 0$$

$$x = -12 \quad ; \quad x = 3$$

Solution set: $\boxed{\{-12, 3\}}$

#14

$$x^4 - 11x^2 + 18 = 0$$

$$(\overset{u}{\boxed{x^2}})^2 - 11\overset{u}{\boxed{x^2}} + 18 = 0 \rightarrow \text{u- Substitution}$$

Let $u = x^2$

Rewrite in u:

$u^2 - 11u + 18 = 0$

$(u-2)(u-9) = 0$

$u - 2 = 0$ or $u - 9 = 0$

$u = 2$; $u = 9$.

When $u = 2$: $x^2 = 2 \rightarrow x = \pm\sqrt{2}$

When $u = 9$: $x^2 = 9 \rightarrow x = \pm\sqrt{9} = \pm 3$

Solution set: $\{\sqrt{2}, -\sqrt{2}, 3, -3\}$

#15

$g(x) = 4x - 4$. Find $g(x-1)$

$g(x-1) = 4(x-1) - 4$

$= 4x - 4 - 4 = 4x - 8$

#16

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

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

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

$f(x)$

Compare

$f(-x) = -f(x)$. So, f is ODD

#17 $3x^4 - 300x^2 = 0$

$3x^2(x^2 - 100) = 0$ (Factor out the common factor $3x^2$)

$3x^2 = 0$ or $x^2 - 100 = 0$

$x^2 = \frac{0}{3} = 0$ | $x^2 = 100$

$x = 0$ | $x = \pm\sqrt{100} = \pm 10$

Solution set: $\{0, -10, 10\}$

#18

$\sqrt{20x - 20} = x + 4$

$\left(\sqrt{20x - 20}\right)^2 = (x+4)^2$ (Square both sides)

$20x - 20 = (x+4)(x+4)$

$20x - 20 = x^2 + 4x + 4x + 16$

$20x - 20 = x^2 + 8x + 16$

$0 = x^2 + 8x + 16 - 20x + 20$

$0 = x^2 - 12x + 36$

$0 = (x-6)(x-6)$

So, $x - 6 = 0$. So, $x = 6$

Check solution: Plug $x = 6$ into original equation: → Solution.

$\sqrt{20 \cdot (6) - 20} = 6 + 4$

$\sqrt{100} = 10$. True.

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Solution set: $\{6\}$