Bellwork: ACT Prep

In the figure below, ABCD is a square. Points are chosen on each pair of adjacent sides of ABCD to form 4 congruent right triangles, as shown below. Each of these has one leg that is twice as long as the other leg. What fraction of the area of square ABCD is shaded?

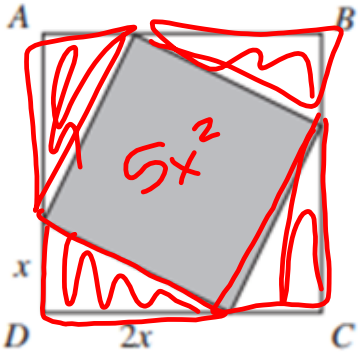
A. $\frac{1}{9}$

B. $\frac{2}{9}$

C. $\frac{4}{9}$

D. $\frac{5}{9}$

E. $\frac{8}{9}$



$A = (3x)(3x)$

$A = 9x^2$

$5x^2$

$\frac{1}{2}bh$

$\frac{1}{2} \times (2x) = x^2$

$4x^2$

Lesson 6.1 Objectives:

I can use substitution to solve problems

Directions:

- Indentify that a function can be considered quadratic ($ax^2 + bx + c$)
- Substitute u for your "x" term, in this case: $u = y^2$
- Solve by factoring or quadriatic formula
- Plug back in what was substituted for u, and solve

Example:

$y^4 - 6y^2 - 40 = 0$

$(y^2)^2 - 6y^2 - 40 = 0$

$u^2 - 6u - 40 = 0$

$(u - 10)(u + 4) = 0$

$u = 10, \quad u = -4$

$y^2 = 10, \quad y^2 = -4$

$y = \pm\sqrt{10}, \pm 2i$

Example 5:

Solve $(2x+5)^2 - 3(2x+5) - 40 = 0$.

$u = 2x+5$

$u^2 - 3u - 40 = 0$

$(u-8)(u+5) = 0$

$u = 8, -5$

$x = \frac{3}{2}, -5$

-40: $-8 \cdot 5$, $1 \cdot -3$

$2x+5 = 8$

$-5 \quad -5$

$\frac{2x}{2} = \frac{3}{2}$

$2x+5 = -5$

$-5 \quad -5$

$\frac{2x}{2} = \frac{-10}{2}$

Solve: $5^{2x} - 4 \cdot 5^x = 12$

$-12 \quad -12$

$5^{2x} - 4 \cdot 5^x - 12 = 0$

$u = 5^x$

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

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

$u = -2, 6$

-12: $2 \cdot -6$, $1 \cdot -4$

$\log_5 5^x = \log_5(-2)$

$x = \log_5(-2)$

$\log_5 5^x = \log_5(6)$

$x = \log_5(6)$

Example 6:

Solve $\frac{1}{(2x-1)^2}+\frac{5}{2x-1}=-6$.

$\frac{1}{(2x-1)^2}+\frac{5}{2x-1}+6=0$

$u=\frac{1}{2x-1}$

$u^2=\frac{1}{(2x-1)^2}$

$u^2+5u+6=0$

$(u+2)(u+3)=0$ (2, 6, 3, 1, 1, 5)

$u=-2,-3$

$\frac{(2x-1)1}{2x-1}=-2(2x-1)$ $\frac{1(2x-1)}{2x-1}=-3(2x-1)$

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

$1=-4x+2$ $1=-6x+3$

$-2\quad -2$ $-3\quad -3$

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

$\frac{-1}{-4}=\frac{-4x}{-4}$ $\frac{-2}{-6}=\frac{-6x}{-6}$

$x=\frac{1}{4},\frac{1}{3}$

7) $2x^{2/3}-5x^{1/3}-3=0$

$u=x^{1/3}$

$u^2=(x^{1/3})^2$

$u^2=x^{2/3}$

$2u^2-5u-3=0$

$(u-3)(u+\frac{1}{2})=0$ (-6, -6, 1, 2, -5, 2)

$u=3,-\frac{1}{2}$ -3 $\frac{1}{2}$

$(x^{1/3})^{3/1}=(3)^{3/1}$ $(x^{1/3})^{3}=(-\frac{1}{2})^3$

$x=27,\frac{-1}{8}$

Example 7:

Solve $4x^3 = 8x^2$.

$4x^3 - 8x^2 = 0$

$4x^2(x-2) = 0$

$\frac{4x^2}{4} = \frac{0}{4}$ $\sqrt{x^2} = \sqrt{0}$

$x - 2 = 0 + 2$

$+2$

$x = 0$

$x = 2$

NO ☹

$4 = x^3$

$4^2 = x^4$