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20/20

Quiz#1 Math Analysis

① Solve for x: $27^{2x} = \left(\frac{1}{9}\right)^{x-1}$

$3 \cdot 3 = 9$

$3 \cdot 3 \cdot 3 = 27$

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

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

$3^{6x} = 3^{-2x+1}$

cancel bases (they are the same)

$6x = -2x + 2$

$+2x \quad +2x$

$\frac{8x}{8} = \frac{2}{8}$

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

② If $f(x) = 3x - 4$ and $g(x) = x^2 + 3x - 1$, find $g(f(x))$ and simplify completely.

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

$(3x-4)(3x-4) + 9x - 12 - 1$

$9x^2 - 12x - 12x + 16 + 9x - 12 - 1$

$g(f(x)) = 9x^2 - 24x + 16 + 9x - 13$

$g(f(x)) = 9x^2 - 15x + 3$

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

3 | 3 1

1 | -5

③ State the equation of the line that is perpendicular to $y = \frac{2}{3}x + 5$ and passes throught the point $(6, 2)$.

$(y-2) = \frac{-3}{2}(x-6)$

$\frac{2}{3} \rightarrow \frac{-2}{3} \rightarrow \frac{-3}{2}$

opposite reciprocal

$y - 2 = \frac{-3}{2}x + 9$

$+2 \quad +2$

$y = \frac{-3}{2}x + 11$

check

$y = \frac{-3}{2}(6) + 11$

$\frac{-18}{2}$

$y = -9 + 11$

$2 = 2$

④ Solve $x^3 - 4x^2 = 12x$

$x^3 - 4x^2 = 12x$

$-12x \quad -12x$

$x^3 - 4x^2 - 12x = 0$

$x(x^2 - 4x - 12)$

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

-6 | -12 2

-4

$x - 6 = 0 \quad x + 2 = 0$

$+6 \quad +6 \quad -2 \quad -2$

$x = 6, \; x = -2, \; x = 0$

⑤ a) Identify the parent graph (family)

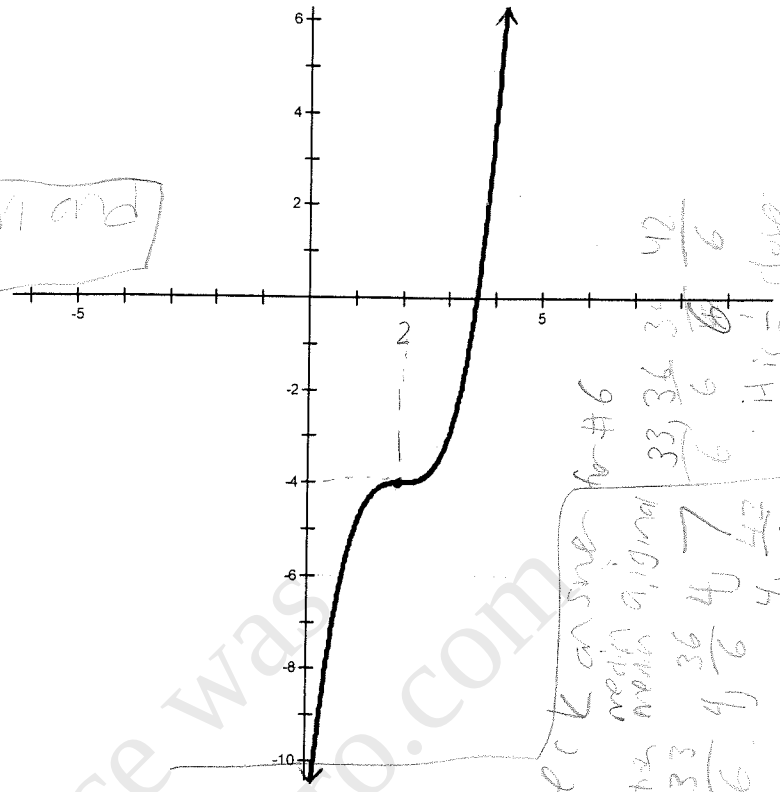
$y = x^3$

b) Describe the transformation from the parent graph

The graph shifted 4 units down and 2 units to the right.

c) Write the equation of the graph.

$y = (x-2)^3 - 4$



check answer (2, -4)

$-4 = (2-2)^3 - 4$

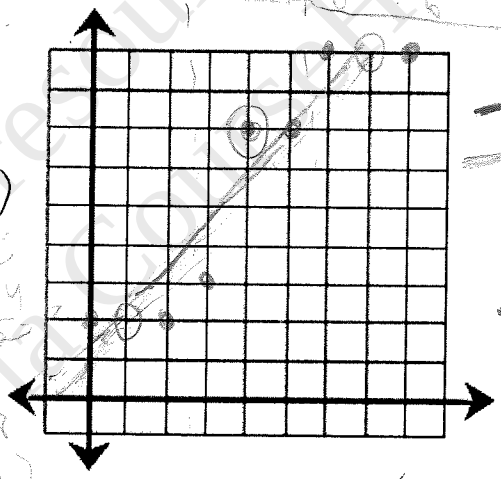
0^3

$0 - 4$

$-4 = -4$

⑥ Find the median–median line of best fit for the following points. Show all of your work clearly.

(0, 2), (2, 2), (3, 4), (4, 7), (5, 7), (6, 9), (8, 9)



Left section | Middle section | Right section

$\frac{2+0}{2} = \frac{2}{2} = 1$ | (4, 7) | $\frac{6+8}{2} = \frac{14}{2} = 7$

$\frac{2+2}{2} = \frac{4}{2} = 2$ | | $\frac{9+9}{2} = \frac{18}{2} = 9$

(1, 2) | | (7, 9)

$\frac{9-2}{7-1} = \frac{7}{6}$

$(y-2) = \frac{7}{6}(x-1)$

$y - 2 = \frac{7}{6}x - \frac{7}{6}$

$+2 \quad +2$

$y = \frac{7}{6}x + \frac{5}{6}$

$\frac{12}{6} - \frac{7}{6} = \frac{5}{6}$

$\frac{12}{6} = 2$

$y = \frac{7}{6}(4) + \frac{5}{6}$

$y = \frac{28}{6} + \frac{5}{6}$

$y = \frac{33}{6}$

$(4, \frac{33}{6})$

$\frac{42}{6} - \frac{33}{6} = \frac{9}{6}$

original

$\frac{9}{6} \cdot \frac{1}{3} = \frac{9}{18}$

$\frac{1}{2}$

$\frac{5}{6} + \frac{1}{2}$

$\frac{5}{6} + \frac{3}{6} = \frac{8}{6} = \frac{4}{3}$

$y = \frac{7}{6}x + \frac{4}{3}$