NAME: _ _ _ _ _ _ _ _ _

ANSWER KEY

Quiz 9

Calculators are not allowed. Write your answers on the dashed lines.

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[20] **Question 1: Simplify these expressions**

[10] • $\frac{2^{x-1}}{4^{x+2}} =$

-3/error

$$\frac{2^{x-1}}{4^{x+2}} = \frac{2^{x-1}}{(2^2)^{x+2}} = \frac{2^{x-1}}{2^{2(x+2)}} = \frac{2^{x-1}}{2^{2x+4}} = 2^{x-1-(2x+4)}$$

$$= 2^{x-1-2x-4}$$

both ok $= \boxed{2^{-x-5}}$ or $\boxed{\frac{1}{2^{x+5}}}$

[10] • $\frac{3^{2x-1}}{27^{3-x}} =$

-3/error

$$\frac{3^{2x-1}}{(3^3)^{3-x}} = \frac{3^{2x-1}}{3^{9-3x}} = 3^{2x-1-(9-3x)}$$

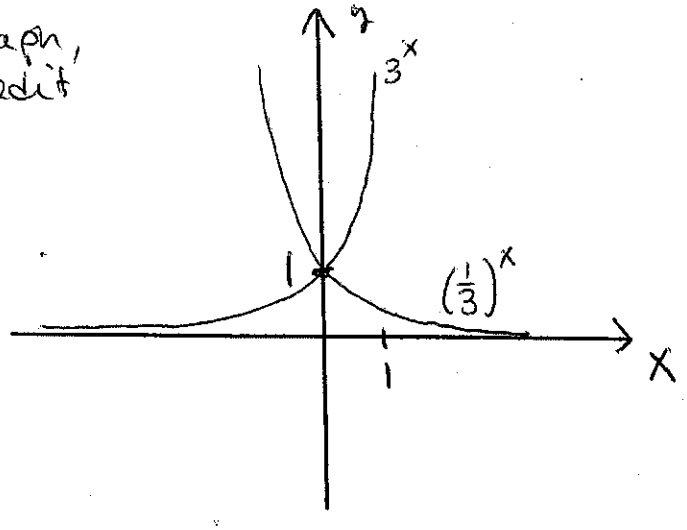
$$= 3^{2x-1-9+3x} = \boxed{3^{5x-10}} \text{ or } \boxed{3^{5(x-2)}}$$

both ok.

[20] **Question 2: Sketching problem**

Sketch $f(x) = 3^x$ and $g(x) = \left(\frac{1}{3}\right)^x$ on this graph, and clearly mark which one is which.

[10] for each graph, no partial credit



[60] **Question 3:** Consider the function $f(x) = 1 - 3^{x-1}$.

[10] • What is the y−intercept? $1 - 3^{0-1} = 1 - \frac{1}{3} = \frac{2}{3}$

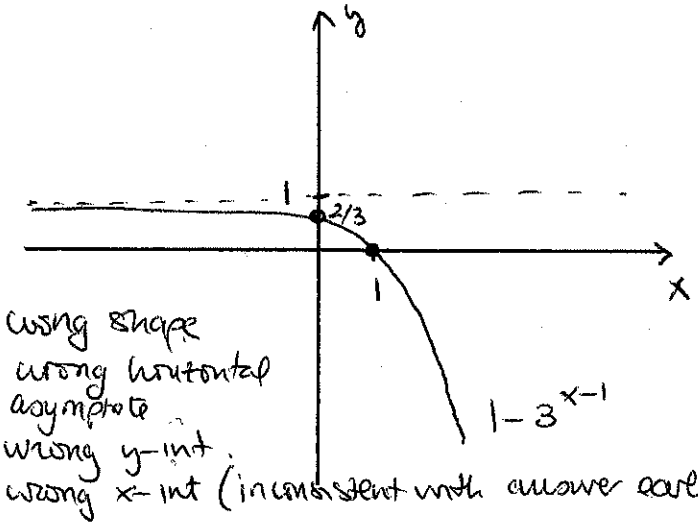
[5] • For which value of x is $3^{x-1} = 1$? $x = 1$

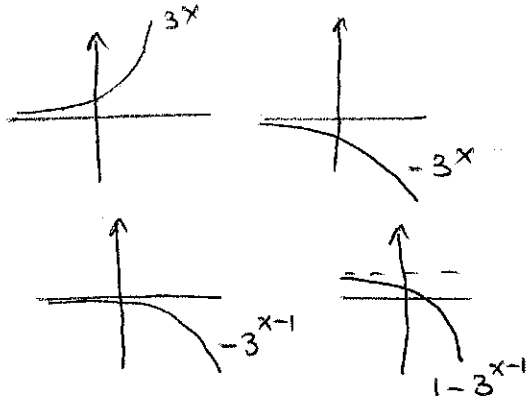
[5] • Based on your answer, find the x−intercept of the graph of $f(x)$ 1

[10] • How would you deduce the graph of $f(x)$ from the graph of 3^x?

(-3/wrong step)
- flip it over x-axis $3^x \to -3^x$
- shift it right by one $-3^x \to -3^{x-1}$
- lift it up by one $-3^{x-1} \to 1 - 3^{x-1}$

[20] • Graph $f(x)$





- −5 if wrong shape
- −5 if wrong horizontal asymptote
- −5 if wrong y-int.
- −5 if wrong x-int (inconsistent with answer earlier).

[10] • What is the horizontal asymptote? $y = 1$