Quiz 3

Key

Show *all* your work. Reasonable supporting work must be shown for any partial credit.

1. Suppose a metal block is cooling so that its temperature (in Celsius) is graphed below, where x is in hours.

(a) [1] Approximate the temperature after 2 hours.

$\approx 140°C$ (+.5)

using $x=2$ (+.5)

(0,226)

y

200

Celsius

150

100

50

0   1   2   3   4 x hours

(b) [1] Approximate how many hours go by before the temperature of the metal is 100°?

just abt after 3.5 hrs

≈ 3.55 hours (+.5)

using $y = 100°C$ (+.5)

(c) [2] Newton's law of cooling lets us know that the temperature of the metal block is of the form De^{-kx} but then vertically shifted. For this particular metal block we know the exponential graph is $200 \cdot 4^{-0.2x}$, but then vertically shifted. Find the algebraic rule for the function graphed here.

Note $200 \cdot 4^{-0.2x}$ (+.5)
passes thru $(0, 200)$
$\Rightarrow$ we need to shift up 26 (+1)

$\Rightarrow y = 200 \cdot 4^{-0.2x} + 26$ (+.5 got it.)

OR of the form $De^{-kx} + v$ (+.5)

$\Rightarrow 200 \cdot 4^{-.2x} + v = y$ (+.5)

thru $(0, 226) \Rightarrow 200 \cdot 4^{-.2 \cdot 0} + v = 226$

$\Rightarrow 200 + v = 226 \Rightarrow v = 26$

so $200 \cdot 4^{-.2x} + 26 = y$ (+.5 got it)

2. [3] We know that $\log(x) = -2.1$, $\log(z^2) = 5$. Find $\log(xz^2)$.

$\log(xz^2) = \log(x) + \log(z^2)$ (+1) OR $\log(x) = -2.1 \Rightarrow 10^{-2.1} = x$ (+.5)

$= -2.1 + 5$

$= 2.9$ (+.5)

$\log(z^2) = 5 \Rightarrow 10^5 = z^2$ (+.5)

$\log(xz^2) = \log(10^{-2.1} \cdot 10^5) = \log(10^{2.9}) = 2.9$ (+.5) (+.5)

strat (+.5)

3. [3] Find x given $(x+1)^{-1} + \frac{1}{2} = 5$.

(+1)

$\frac{1}{x+1} + \frac{1}{2} = 5$

$\frac{2}{x+1} = 10$ ... -1 ... -1

$\frac{2}{x+1} = 9$

$2 = 9(x+1)$

$\frac{2}{9} = x+1$

$\frac{2}{9} - 1 = x$

$-\frac{7}{9} = x$ got it (+.5)

strat (+.5)

strat (+.5)

alg (+1)