University of Michigan
Student Name:

Math 115 Quiz 1

Section 9 - Winter 2011
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Date: January 18 / 2011

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(1) Solve for a:

$$m \cdot 3^{ab} = k \cdot e^a.$$

(Here, b, k and m are constants.)

Solution

To solve for a, we take a logarithm of both sides. We'll use the natural logarithm because there's a factor of e^a on the right hand side of the equation. We get

$$\ln(m \cdot 3^{ab}) = \ln(k \cdot e^a), \quad \text{or}$$
$$\ln(m) + ab\,\ln(3) = \ln(k) + a.$$

To solve for a, we subtract $a + \ln(m)$ from both sides, to get $ab\,\ln(3) - a = \ln(k) - \ln(m)$. Factoring out the a on the left hand side, $a\,(b\,\ln(3) - 1) = \ln(k) - \ln(m)$, so

$$a = \frac{\ln(k) - \ln(m)}{b\ln(3) - 1}.$$

(2) Suppose that the temperature of an office is given by $Q(t) = Q_0 + a\sin(\frac{\pi}{6}t)$, where Q is in °F and t in hours after 8AM. What are the meaning of Q_0 and a? What is the period of this function?.

Solution

The parameter Q_0 is the midline, or average, temperature in the office. The maximum temperature deviation from this is a°F. The period of this function is $\frac{2\pi}{\frac{\pi}{6}} = 12$ hours.