Name:

MATH 105 - SEC 001, FALL 2010. QUIZ 7
TIME LIMIT: 20 MINUTES

INSTRUCTOR: GERARDO HERNÁNDEZ
NOVEMBER 3, 2010

Good luck!

Problem 1. The graph of the function $g(x)$ contains the point $(5, 1/3)$. What point must be on the graph of $y = 3g(x) + 1$?

Since $(5, 1/3)$ is on the graph, then $g(5) = 1/3$. This implies

$$3g(5) + 1 = 3 * \frac{1}{3} + 1 = 2.$$

So, at $x = 5$, $y = 3g(x) + 1$ is 2. As a result, $(5, 2)$ is on the new graph.

Problem 2. The number of gallons of paint, $n = f(A)$, needed to cover a house is a function of the surface area, in ft^2. Match each story to one expression.

a) I figured out how many gallons I needed and then bought two extra gallons just in case.

$$f(A) + 2$$

b) I bought enough paint to cover my house twice.

$$f(2A)$$

c) I bought enough paint to cover my house and my welcome sign, which measures $2ft^2$

$$f(A + 2ft^2)$$

Problem 3.

Find the value of k so that the graph of $y = (x - 3)^2 + k$ passes through the point $(6, 3)$

At $x = 6$, $y = 3$, which implies

$$3 = (6 - 3)^2 + k = 9 + k$$

which implies

$$k = -6,$$

and

$$y = (x - 3)^2 - 6$$

Problem 4. Find the vertex and axis of symmetry of the graph of

$$v(t) = 2t^2 + 11\ t - 4$$

We need to convert the standard form for the quadratic equation into the vertex form, by completing squares

$$v(t) = 2\ t^2 + 11\ t - 4 = 2\left[t^2 + \frac{11}{2}\ t - 2\right] = \left[t^2 + \frac{11}{2}\ t + \left(\frac{11}{4}\right)^2 - \left(\frac{11}{4}\right)^2 - 2\right]$$

$$= 2\left[\left(t + \frac{11}{4}\right)^2 - \frac{11^2}{16} - 2\right] = 2\left[\left(t + \frac{11}{4}\right)^2 - \frac{121 + 32}{16}\right]$$

$$= 2\left[\left(t + \frac{11}{4}\right)^2 - \frac{153}{16}\right] = 2\left(t - -\frac{11}{4}\right)^2 - \frac{153}{8}.$$

Therefore, the vertex is

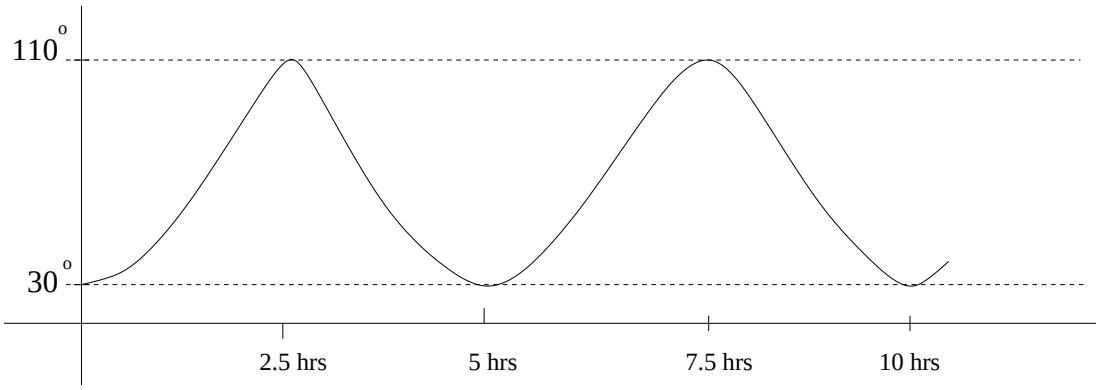
$$(h, k) = \left(-\frac{11}{4}, -\frac{153}{8}\right),$$

and the axis of symmetry is the line given by the equation:

$$x = -\frac{11}{4}$$

Problem 5. The temperature of a chemical reaction oscillates between a low of 30°C and a high of 110°C. The temperature is at its lowest point when $t = 0$ and completes one cycle over a five-hour period.

a) Sketch the temperature, T, against the elapsed time, t, over a ten-hour period.



b) Find the period, the amplitude, and the midline of the graph you drew in part a)

Period: 5 hrs

Midline: $T = 70$°C

Amplitude: 40°C