MTH 204
Quiz 1
19 Jan 2007

Name: Key
Section: B/C

Please read the directions carefully. You must show all your work in order to receive full credit. Please write neatly in pencil. If you get stuck, feel free to ask me for help.

Test 1: 26 Jan
Sec 1.1-

1. Suppose that a bag of blood plasma is removed from cold storage, where it was stored at 40°F. Before the plasma can be used, it must be placed in an oven at 120°F. After 45 minutes, the temperature of the plasma is 90°F. Assume that Newton's law of cooling applies and set a boundary value problem that describes the change in temperature of the plasma.

Let $T(t)$ be the temperature of the plasma

Let T_m be the temperature of the oven

Then $\frac{dT}{dt} = k(T - T_m) = k(T - 120)$ $\begin{cases} T(0) = 40 \\ T(45) = 90 \end{cases}$

2. Consider the DE $\frac{dy}{dx} = (y+3)(y-2)^2$. Find all critical points and classify each as asymptotically stable, unstable, or semi-stable. Then draw the appropriate phase line (portrait).

$\frac{dy}{dx} = (y+3)(y-2)^2 = 0$

CP: $y = -3, 2$

Int	TV	+/-	↗/↘
$(-\infty, -3)$	-4	$-$	↓
$(-3, 2)$	0	$+$	↑
$(2, \infty)$	3	$+$	↑