Exam 2 **Math 115** Spring 2006

Name: Solutions Section:__________

IMPORTANT: All answers must include either supporting work or an explanation of your reasoning. These elements are considered part of the answer and will be graded.

1. For each part, if the statement is always true, circle the printed capital T. If the statement is sometimes false, circle the printed capital F.

(a) (2 points) A global maximum is always a critical point. (a) T F

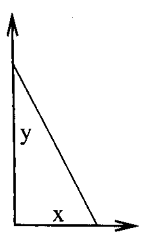
(b) (2 points) A function defined on all points of a closed interval always has a global maximum and a global minimum. (b) T F

(c) (2 points) The inflection points of a function f are the local extrema of f'. (c) T F

(d) (2 points) If $f''(x) = 0$ at $x = 0$, then the graph of f changes concavity at $x = 0$. (d) T F

(e) (2 points) If $f' > 0$ on an interval, the function is concave up on the interval. (e) T F

2. The foot of the ladder of length 10 feet, shown in the figure, moves away from the wall at a speed of 2 ft/sec, causing the top of the ladder to slide down the wall without leaving it.



$dx/dt = 2$ $\qquad$ $x^2+y^2=10$

(a) (4 points) Find the equation expressing the relation between $\frac{dx}{dt}$ and $\frac{dy}{dt}$.

$x^2+y^2=10 \Rightarrow 2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$

(b) (4 points) s it true or false that $\frac{dx}{dt}$ and $\frac{dy}{dt}$ have the same sign? Justify your answer.

no they have opposite signs b/c $x\,dx/dt = -y\,dy/dt$ and both x and y are positive

(b) (4 points) Is it true or false the top of the ladder is moving faster and faster? Justify your answer.

$x\frac{dx}{dt} = -y\frac{dy}{dt}$ $\qquad$ $\frac{dy}{dt} = -\frac{x}{y}\frac{dx}{dt}$ $\qquad$ x is getting bigger and y is getting smaller, so yes the top of the ladder speeds up

(c) (4 points) Keeping $\frac{dx}{dt}$ constant, doubling x and y and the length of the ladder, doubles $\frac{dy}{dt}$. Is this statement true or false? Justify your answer.

$\frac{dy}{dt} = -\frac{x}{y}\cdot\frac{dx}{dt}$ $\qquad$ so doubling both x and y would leave $\frac{dy}{dt}$ unchanged.