Math 171 - Quiz 7

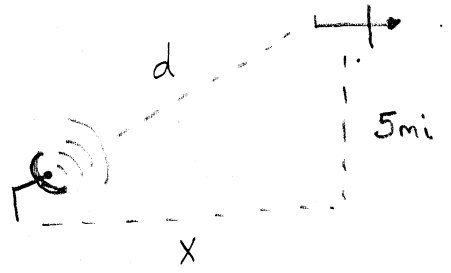
October 10, 2013

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (6 points) An airplane is flying at an altitude of 5 miles. When the plane is 10 miles from a radar antenna, radar detects that the distance between the antenna and the plane is increasing at a rate of 240 miles per hour. What is the speed of the plane?



d = DISTANCE FROM RADAR TO PLANE AT TIME t

X = LENGTH ALONG GROUND FROM RADAR TO PLANE

$\frac{dd}{dt} = 240$. FIND $\frac{dx}{dt}$ WHEN $d = 10$

$d^2 = X^2 + 25$

$2d\frac{dd}{dt} = 2x\frac{dx}{dt}$

$\frac{d\frac{dd}{dt}}{X} = \frac{dx}{dt}$

WHEN $d = 10$...

$100 = X^2 + 25$

$X = \sqrt{75}$

$\frac{dx}{dt} = \frac{10}{\sqrt{75}} \cdot 240$

$\approx$ 277.13 mi/hr

2. (4 points) Find the absolute extreme values of $f(x) = \sin(\pi x) + \cos(\pi x)$ on $[0, 5/4]$.

$f'(x) = \pi\cos\pi x - \pi\sin\pi x$

$f'(x)$ DNE NOWHERE

$f'(x) = 0 \Rightarrow \cos\pi x = \sin\pi x$

$\Rightarrow \tan\pi x = 1$

$\Rightarrow x = \frac{1}{4}$

ENDPTS & CRIT #'s

$f(0) = 1$

$f(\frac{1}{4}) = \sqrt{2}$ = ABS MAX

$f(\frac{5}{4}) = -\sqrt{2}$ = ABS MIN