Quiz 1 Name: Key
Math 253 08/30/19

A 135-lb. rocket is located at the origin $(0, 0, 0)$, and pointed toward the point $(0, 300, 400)$. At the instant it takes off, two forces act on it: gravity and the force produced by its jet engines. The engines produce 1000 lbs. of thrust.

1. Give, in coordinate form, a vector representing the force of gravity on the rocket.

$\vec{G} = \langle 0, 0, -135 \rangle$ lbs

2. Give, in coordinate form, a vector representing the force resulting from the engines at take-off.

$\vec{F}_E = c\langle 0, 300, 400 \rangle$

$\|\vec{F}\| = 1000 = 10^3$

$10^6 = \vec{F} \cdot \vec{F} = c^2(300^2 + 400^2)$

$100 = c^2 \cdot 25$

$c = 2$

$\vec{F}_E = \langle 0, 600, 800 \rangle$ lbs

3. Give, in coordinate form, a vector representing the total force on the rocket at take-off. Specify units.

$\vec{G} + \vec{F}_E = \langle 0, 0, -135 \rangle + \langle 0, 600, 800 \rangle$

$= \langle 0, 600, 665 \rangle$ lbs