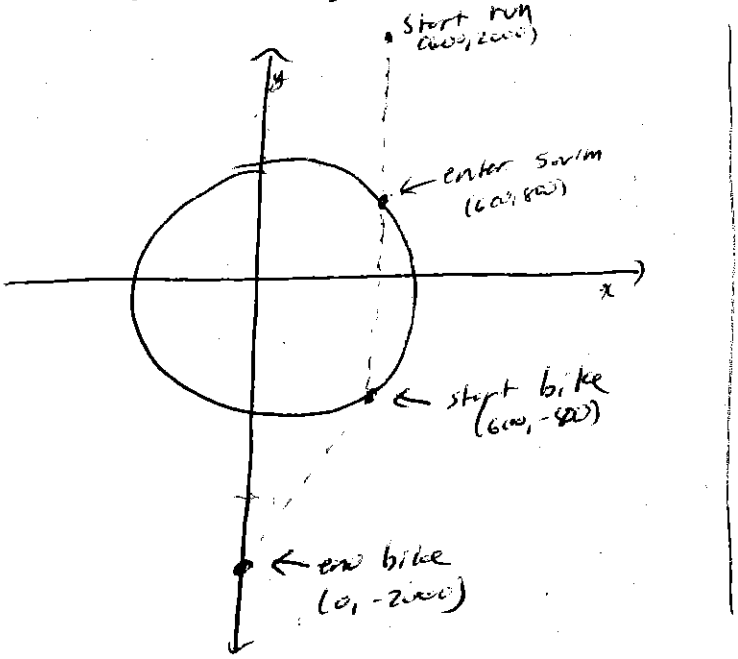
Math 120 B | Quiz 1 (20 minutes) | April 5, 2017

Name: Key

Answer the questions in the spaces provided. If you have any questions, raise your hand and I will come try to answer.

1. Jerry and Bobby are racing in a triathlon, a race where competitors run, then swim, and then bike. It takes place near a circular lake of radius equal to 1000 meters. The race begins 600 meters east and 2000 meters north of the center of the lake. Competitors run due south, until they reach the lake. They then enter the water and swim due south until they reach the opposite shore. Finally, the bike in a straight line towards a point 2000 meters due south of the center lake.

   (a) (6 points) Choose a coordinate system and draw a picture. Label the points where the race starts and ends, as well as where the competitors enter and exit the lake. **Include explicit coordinates for each labeled point.**




   (b) (6 points) Compute the distance the competitors have to run, the distance they have to swim, and the distance they have to bike, rounding to one decimal place.

Run: (600, 2000) to (600, 800)
so 1200 meters

Swim: (600, 800) to (600, -800)
so 1600 meters

Bike: (600, -800) to (0, -2000)
so $\sqrt{(600-0)^2 + (-800+2000)^2}$
$= \sqrt{1,800,000}$
$\approx 1341.6$

2 pts each

Distance Running: 1200m
Distance Swimming: 1600m
Distance Biking: 1341.6m

If they do time = dist + rate

-3

| Event | Bobby's Time | Jerry's Time |
|---|---|---|
| Run | 200 | 240 |
| Swim | 800 | 533.3 |
| Bike | 89.4 | 118.8 |

use $d = rt$ → $t = \frac{d}{r}$

(c) (6 points) Bobby is a faster runner and a faster biker. His running speed is 6 m/s, and his biking speed is 15 m/s. Jerry's running speed is 5 m/s and his biking speed is 12 m/s. Jerry, on the other hand, is a faster swimmer, swimming at 3 m/s while Bobby swims at 2 m/s. Compute how long each competitor spends at each event, filling in the table above.

1 pt each

| | Bobby | Jerry |
|---|---|---|
| Run | $\frac{d}{r} = \frac{1200\text{ m}}{6\text{ m/s}} = 200\text{s}$ | $\frac{1200\text{m}}{5\text{ m/s}} = 240\text{ s}$ |
| Swim ~~Bike~~ | $\frac{1600\text{m}}{2\text{ m/s}} = 800\text{s}$ | $\frac{1600\text{m}}{3\text{ m/s}} = 533.3\text{ s}$ |
| Bike | $\frac{1341.6\text{m}}{15\text{ m/s}} = 89.4\text{s}$ | $\frac{1341.6\text{m}}{12\text{ m/s}} = 111.8\text{s}$ |

(d) (2 points) Compute each competitors final times. Who won the race?

Bobby: $200 + 800 + 89.4 = 1089.4$ seconds

Jerry: $240 + 533.3 + 111.8 = 885.1$ seconds

Jerry Wins