Math 100. Quiz 4. 2017-11-03 (Friday) **Time 25min**

Section ....   Instructor name ....

Your email ....

- **For each computation of limits in this test, if the limit does not exist, indicate whether it diverges to $-\infty$ or $+\infty$.**

- Simplify all your answers as much as possible and express answers in terms of fractions or constants such as $\frac{1}{100}$, $\sqrt{e}$ or $\ln(4)$ rather than decimals.

1. **(2pts)** A turkey is taken out of a hot oven at 400 degrees Fahrenheit and placed on a table in the dining room which is at constant 70 degrees Fahrenheit. After 25 minutes, the turkey has the temperature of 180 degrees Fahrenheit. Find the formula for the turkey's temperature with respect to time t. **You have to show all your work in order to get credit.**

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Reserve this space for work for Problem 3.

2. You have to show all your work in order to get credit.

(a) **(2pts)** Estimate $\sqrt[3]{7}$ using a **linear approximation**.

(b) **(2pts)** A particle is moving on the x-axis and its position at time t (measured in seconds) is given by $s(t) = t^2 - 4t$ (measured in meters). Find the **total distance traveled** by the particle in the first 3 seconds.

3. **(4pts)** Two particles A and B are moving in the xy-plane. Particle A starts at the point $(11, 0)$ and moves along the x-axis toward the origin with the constant speed v. Particle B starts at the point $(0, 6)$ and moves along the y-axis, away from the origin with the **same** speed v. The rate of change of the distance between the two particles is equal to 5 units per minute at the moment when the distance between the two particles is equal to 13 units. Find the common speed v of the two particles. **You have to show all your work in order to get credit.**

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1. **(2pts)** A lasagna is taken out of a hot oven at 170 degrees Fahrenheit and placed on a table in the dining room which is at constant 70 degrees Fahrenheit. After 20 minutes, the lasagna has the temperature of 120 degrees Fahrenheit. Find the formula for the lasagna's temperature with respect to time t. **You have to show all your work in order to get credit.**

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Reserve this space for work for Problem 3.

2. **You have to show all your work in order to get credit.**

   (a) **(2pts)** Estimate $\sqrt[3]{9}$ using a **linear approximation**.

   (b) **(2pts)** A particle is moving on the x-axis and its position at time t (measured in seconds) is given by $s(t) = 12t - 3t^2$ (measured in meters). Find the **total distance traveled** by the particle in the first 3 seconds.

3. (4pts) Two particles A and B are moving in the xy-plane. Particle A starts at the point $(10, 0)$ and moves along the x-axis away from the origin with the constant speed v. Particle B starts at the point $(0, 7)$ and moves along the y-axis, toward the origin with the same speed v. The rate of change of the distance between the two particles is equal to 3 units per minute at the moment when the distance between the two particles is equal to 13 units. Find the common speed v of the two particles. **You have to show all your work in order to get credit.**