MATH 105: QUIZ 2

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NOTE: Write your name *and* section number. Each question is worth 10 points. You have 30 minutes to do the quiz, which is closed book. Do not use computers or any other devices.

Question 1 : Find the equation for the plane containing the point $(17, 0, 1)$ with normal direction $(17, 9, 3)$.

Solution: A point (x, y, z) is in the plane if $(x, y, z) - (17, 0, 1)$ is perpendicular to the normal $(17, 9, 3)$. This means $((x, y, z) - (17, 0, 1))\cdot (17, 9, 3) = 0$, or equivalently $(x, y, z)\cdot(17, 9, 3) = (17, 0, 1)\cdot(17, 9, 3)$, or $17x + 9y + 3z = 292$.

Question 2 : Evaluate $\lim_{x\to 1} \frac{x^3-3x^2+3x-1}{2x-2}$.

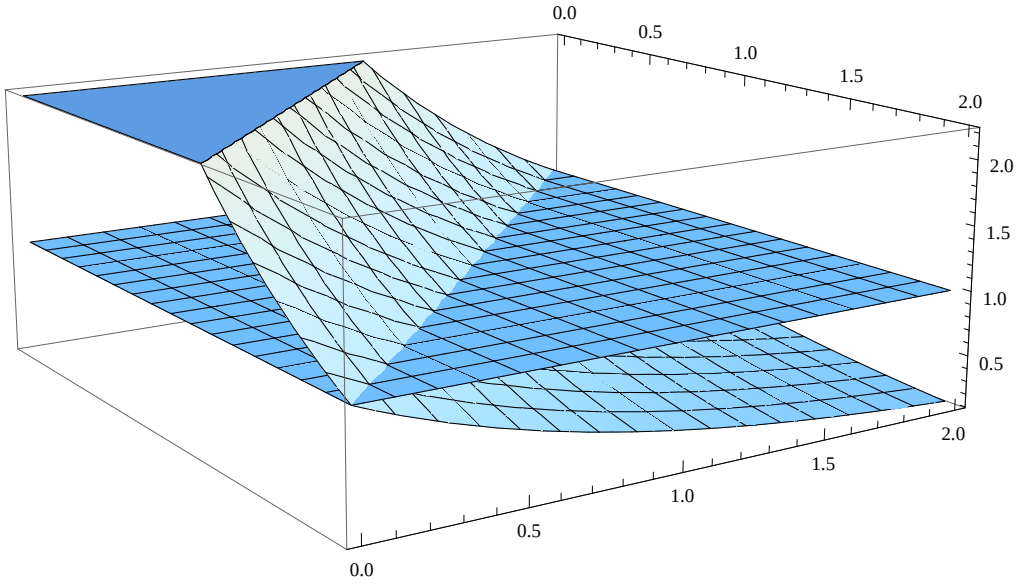
Solution: As $x \to 1$ the numerator tends to 1-3+3-1 = 0, and the denominator tends to 2-2 = 0. Thus one solution is to use L'Hopital's rule, which tells us that this limit is the same as $\lim_{x\to 1} \frac{3x^2-6x+3}{2} = 0$. Alternatively, we could notice that the numerator is just $(x - 1)^3$ and the denominator is $2(x - 1)$. Thus our quotient is the same as $(x - 1)^3/2(x - 1) = (x - 1)^2/2$. We can now easily take the limit as $x \to 1$, and obtain $0^2/2 = 0$.

Question 3 : Let $f(x, y) = \exp(2 - x - y)$. Find the level set of value 1 of the function $f(x, y)$.

Solution: We want to find all (x, y) such that $f(x, y) = \exp(2 - x - y) = 1$. Taking logarithms, we see that this is equivalent to $2 - x - y = 0$, which is just the line $y = -x + 2$.

We sketch the level set below.

Date: February 15, 2010.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