Mathematics 1100Y – Calculus I: Calculus of one variable

Quizzes

Quiz #1. Wednesday, 11 May, 2011. *[10 minutes]*

1. Compute $\lim\limits_{x \to -3} \dfrac{x+3}{x^2-9}$ using the appropriate limit laws and algebra. *[5]*

Quiz #2. Monday, 16 May, 2011. *[10 minutes]*

Do *one* of questions 1 or 2.

1. Use the ε-δ definition of limits to verify that $\lim\limits_{x \to 1}(3x-2) = 1$. *[5]*

2. Find the x- and y-intercepts and all the horizontal asymptotes of $f(x) = \dfrac{x^2}{x^2+1}$, and sketch its graph. *[5]*

Quiz #3. Wednesday, 18 May, 2011. *[10 minutes]*

1. Use the limit definition of the derivative to compute $f'(a)$ for $f(x) = \dfrac{1}{x}$. (You may assume that $a \neq 0$.) *[5]*

Quiz #4. Wednesday, 25 May, 2011. *[10 minutes]*

1. Compute $f'(x)$ for $f(x) = \ln\left(\dfrac{x}{1+x^2}\right)$. *[5]*

Quiz #5. Monday, 30 May, 2011. *[10 minutes]*

Do *one* of questions 1 or 2.

1. Find $\dfrac{dy}{dx}$ at the point $(2,2)$ on the curve defined by $x = \sqrt{x+y}$. *[5]*

2. Find $\dfrac{dy}{dx}$ at $x = e$ for $y = \ln(x\ln(x))$. *[5]*

Quiz #6. Wednesday, 1 June, 2011. *[15 minutes]*

1. A $3\,m$ long, very stretchy, bungee cord is suspended from a hook $4\,m$ up on a wall. The other end of the cord is grabbed by a child who runs directly away from the wall at $2\,m/s$, holding the end of the cord $1\,m$ off the ground, stretching the cord in the process. How is the length of the cord changing at the instant that the child's end of the cord is $4\,m$ away from the wall? *[5]*
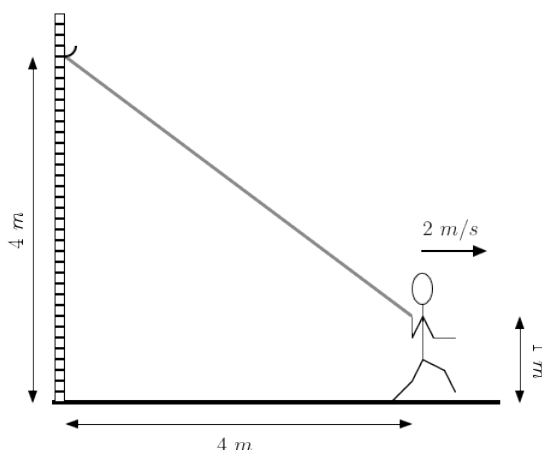
Quiz #7. Monday, 6 June, 2011. *[15 minutes]*

1. Find any and all intercepts, intervals of increase and decrease, local maxima and minima, and vertical and horizontal asymptotes, of $y = xe^{-x}$, and sketch this curve based on the information you obtained. *[5]*

Bonus: Find any and all the points of inflection of this curve too. *[1]*

Hint: You may assume that $\lim\limits_{x \to +\infty} xe^{-x} = 0$. For $\lim\limits_{x \to -\infty} xe^{-x}$ you're on your own.

Quiz #8. Monday, 13 June, 2011. *[10 minutes]*

1. Compute $\lim\limits_{x \to \infty} \dfrac{x^2}{e^x}$. *[5]*

Quiz #9. Monday, 20 June, 2011. *[10 minutes]*

Do *one* of questions 1, 2, or 3.

1. Compute $\int_1^2 (x+1)\,dx$ using the Right-Hand Rule. *[5]*

   Hint: You may assume that $1 + 2 + 3 + \cdots + n = \sum\limits_{i=1}^{n} i = \frac{n(n+1)}{2}$.

2. Compute $\int_{-1}^{3} (x+1)^2\,dx$. *[5]*

3. Compute $\int \sin(x)\cos(x)\,dx$. *[5]*

Quiz #10. Wednesday, 22 June, 2011. *[10 minutes]*

1. Find the area of the region between the curves $y = \cos(x)$ and $y = \sin(x)$, where $0 \le x \le \pi$. *[5]*

   Hint: Recall that $\sin\left(\frac{\pi}{4}\right) = \cos\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$.

Quiz #11. Monday, 27 June, 2011. *[10 minutes]*

1. Sketch the solid obtained by rotating the region bounded by $y = \sqrt{x}$ and $y = 0$, where $0 \le x \le 4$, about the x-axis and find its volume. *[5]*

Quiz #12. Wednesday, 29 June, 2011. *[10 minutes]*

1. Sketch the solid obtained by rotating the region between $y = e^x$ and $y = 1$, where $0 \le x \le 1$, about the y-axis and find its volume. *[5]*

Quiz #13. Monday, 4 July, 2011. *[10 minutes]*

1. Compute $\displaystyle\int \sec^3(x)\tan^3(x)\,dx$. *[5]*

Quiz #14. Monday, 11 July, 2011. *[15 minutes]*

1. Compute $\displaystyle\int \dfrac{1}{x^4 + x^2}\,dx$. *[5]*

Quiz #15. Wednesday, 13 July, 2011. *[10 minutes]*

1. Compute $\displaystyle\int_1^{\infty} \dfrac{1}{x^2}\,dx$. *[5]*

Quiz #16. Monday, 18 July, 2011. *[12 minutes]*

Do *one* of questions 1 or 2.

1. Find the arc-length of the curve $y = \dfrac{2}{3}x^{3/2}$, where $0 \le x \le 3$. *[5]*

2. Find the area of the surface of revolution obtained by rotating the curve $y = 1 - \dfrac{1}{2}x^2$, where $0 \le x \le \sqrt{3}$, about the y-axis. *[5]*

Quiz #17. Wednesday, 19 July, 2011. *[12 minutes]*

Do *one* of questions 1 or 2.

1. Sketch the curve $r = \theta$, $0 \le \theta \le \pi$, in polar coordinates and the area of the region between the curve and the origin. *[5]*

2. For which values of x does the series $\sum\limits_{n=0}^{\infty} x^{n+2} = x^2 + x^3 + x^4 + \cdots$ converge? What is the sum when it does converge? *[5]*

Quiz #18. Monday, 25 July, 2011. *[12 minutes]*

1. Determine whether the series $\sum\limits_{n=1}^{\infty} \dfrac{1}{n^2 + 2^n}$ converges or diverges. *[5]*

Quiz #19. Wednesday, 27 July, 2011. *[12 minutes]*

Do *one* of questions 1 or 2.

1. Determine whether the series $\sum\limits_{n=1}^{\infty} \dfrac{(-2)^n}{(n+1)!}$ converges absolutely, converges conditionally, or diverges. *[5]*

2. Determine whether the series $\sum\limits_{n=1}^{\infty} \dfrac{(-1)^n e^n}{n}$ converges absolutely, converges conditionally, or diverges. *[5]*