Mathematics 1100Y – Calculus I: Calculus of one variable
TRENT UNIVERSITY, Summer 2010
Quizzes

Quiz #1 *Wednesday, 12 May, 2010. [10 minutes]*

1. Suppose the graph of $y = x^2$ is stretched vertically by a factor of 3, and then shifted by 2 units to the right and 1 unit down. Find the formula of the parabola with this curve as its graph. *[5]*

2. Use the Limit Laws to evaluate $\lim\limits_{x \to 0} \dfrac{x^2 - 1}{x^2 + 1}$. *[5]*

Quiz #2 *Monday, 17 May, 2010. [12 minutes]*

Do *one* (1) of the following two questions.

1. Find all the vertical and horizontal asymptotes of $f(x) = \dfrac{x}{x - 1}$ and give a rough sketch of its graph. *[10]*

2. Use the ε–δ definition of limits to verify that $\lim\limits_{x \to 1} (3x - 1) = 2$. *[10]*

Quiz #3 *Wednesday, 19 May, 2010. [10 minutes]*

1. Compute the derivative of $f(x) = \dfrac{x^2 - 2x}{x - 1}$. *[5]*

2. Compute the derivative of $g(x) = \arctan\left(e^x\right)$. *[5]*

Quiz #4 *Wednesday, 26 May, 2010. [12 minutes]*

1. Use logarithmic differentiation to compute the derivative of $g(x) = x^x$. *[5]*

2. A pebble is dropped into a still pond, creating a circular ripple that moves outward from its centre at 2 *m/s*. How is the area enclosed by the ripple changing at the instant that the radius of the ripple is 3 *m*? *[5]*
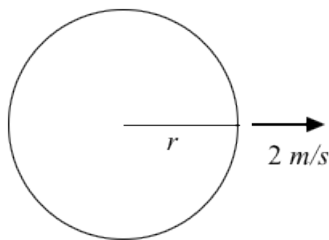
(*Just in case:* The area of a circle with radius r is πr^2.)

Quiz #5 *Monday, 31 May, 2010. [15 minutes]*

1. Let $f(x) = \dfrac{x}{x^2 + 1}$. Find the domain and all the intercepts, vertical and horizontal asymptotes, and local maxima and minima of $f(x)$, and sketch its graph using this information. *[10]*

Quiz #6 *Wednesday, 2 June, 2010. [10 minutes]*

1. Use the Left-Hand Rule to compute $\int_0^1 (x+1)\, dx$, the area between the line $y = x+1$ and the x-axis for $0 \le x \le 1$. *[10]*

   Hint: You may need the formula $\sum_{i=1}^{n} i = 1 + 2 + 3 + \cdots + n = \dfrac{n(n+1)}{2}$.

Quiz #7 *Monday, 7 June, 2010. [10 minutes]*

1. Compute $\int_0^2 \left(x^2 - 2x + 1\right)\, dx$. *[10]*
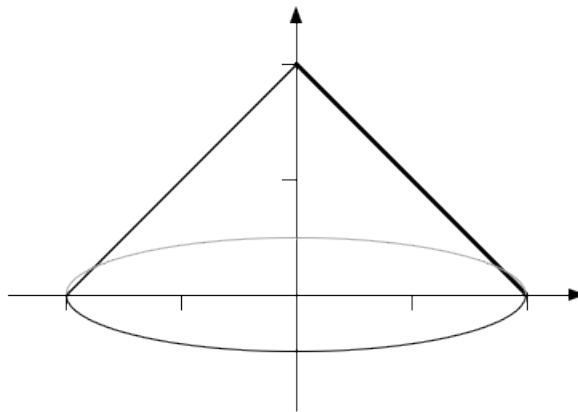
Quiz #8 *Wednesday, 9 June, 2010. [10 minutes]*

1. Find the area between $y = x\cos\left(x^2\right)$ and the x-axis for $-\sqrt{\frac{\pi}{2}} \le x \le \sqrt{\frac{\pi}{2}}$. *[10]*

Quiz #9 *Monday, 14 June, 2010. [10 minutes]*

The region between $y = 2 - x$ and the x-axis, for $0 \le x \le 2$, is rotated about the y-axis. Find the volume of the resulting solid of revolution using both

1. the disk method *[5]* and
2. the method of cylindrical shells. *[5]*

Quiz #10 *Wednesday, 16 June, 2010. [10 minutes]*

1. Compute $\int_1^e \left(\ln(x)\right)^2\, dx$. *[10]*

Quiz #11 *Monday, 21 June, 2010. [12 minutes]*

Compute each of the following integrals:

1. $\int_0^{\pi/2} \cos^3(x)\sin^2(x)\, dx$ *[5]*   2. $\int \sec^3(x)\, dx$ *[5]*

Quiz #12 *Wednesday, 23 June, 2010. [15 minutes]*

Compute each of the following integrals:

1. $\int \dfrac{1}{\sqrt{4 - x^2}}\, dx$ *[5]*   2. $\int_1^2 x\sqrt{x^2 - 1}\, dx$ *[5]*

Quiz #13 *Monday, 28 June, 2010. [12 minutes]*

1. Compute $\int \dfrac{2x^2 + 3}{(x^2 + 4)(x - 1)}\, dx$.   *[10]*

Quiz #14 *Wednesday, 30 June, 2010. [10 minutes]*

1. Compute $\int_0^\infty \dfrac{1}{x^2 + 1}\, dx$.   *[10]*

Quiz #15 *Monday, 5 July, 2010. [10 minutes]*

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

Quiz #16 *Wednesday, 7 July, 2010. [15 minutes]*

1. Find the arc-length of the parametric curve $x = t\cos(t)$ and $y = t\sin(t)$, where $0 \le t \le 1$. *[10]*

Quiz #17 *Monday, 12 July, 2010. [15 minutes]*

1. Sketch the curve given by $r = \sin(\theta)$, $0 \le \theta \le \pi$, in polar coordinates. *[2]*

2. Sketch the curve given by $r = \sin(\theta)$, $\pi \le \theta \le 2\pi$, in polar coordinates. *[2]*

3. Find the area of the region enclosed by the curve given by $r = \sin(\theta)$, $0 \le \theta \le \pi$, in polar coordinates. *[6]*

Bonus: Find an equation in Cartesian coordinates for the curve given by $r = \sin(\theta)$, $0 \le \theta \le \pi$, in polar coordinates. *[2]*

Quiz #18 *Wednesday, 14 July, 2010. [12 minutes]*

1. Use the definition of convergence of a series to compute $\displaystyle\sum_{n=1}^{\infty} \dfrac{1}{n(n+1)}$. *[10]*

   Hint: Note that $\dfrac{1}{k(k+1)} = \dfrac{1}{k} - \dfrac{1}{k+1}$.

Quiz #19 *Monday, 19 July, 2010. [10 minutes]*

1. Determine whether the series $\displaystyle\sum_{n=0}^{\infty} \dfrac{1}{n^2 + 1}$ converges or diverges. *[10]*

Quiz #20 *Wednesday, 21 July, 2010. [12 minutes]*

1. Determine whether the series $\displaystyle\sum_{n=0}^{\infty} \dfrac{\cos(n\pi)}{1 + n}$ converges conditionally, converges absolutely, or diverges. *[10]*

Quiz #21 *Monday, 26 July, 2010. [15 minutes]*

1. Find the radius and interval of convergence of the power series $\displaystyle\sum_{n=0}^{\infty} \dfrac{n3^n}{2^{n+1}}x^n$. *[10]*

Quiz #22 *Wednesday, 28 July, 2010. [15 minutes]*

1. Find the Taylor series of $f(x) = \ln(x)$ at $a = 1$. *[10]*