**Mathematics 1100Y – Calculus I: Calculus of one variable**
TRENT UNIVERSITY, Summer 2012

## Quizzes

**Quiz #1.** Wednesday, 16 May, 2012. *[10 minutes]*

Let $f(x) = 2x - 1$.

1. Sketch the graph of $f(x)$. *[2]*
2. Sketch the graph of $f^{-1}(x)$, the inverse function of $f(x)$. *[1]*
3. Find a formula for $f^{-1}(x)$. *[2]*

**Quiz #2.** Wednesday, 23 May, 2012. *[10 minutes]*

Consider the parametric curve given by $y = \cos(2t)$ and $x = \cos(t)$, where $-\frac{\pi}{2} \leq t \leq \frac{\pi}{2}$.

1. Show that every point on this curve is on the parabola given by $y = 2x^2 - 1$. *[3]*
2. Sketch the parametric curve. (Warning: it is not all of the parabola ... ) *[2]*

**Quiz #3.** Monday, 28 May, 2012. *[10 minutes]*

1. Compute $\lim_{x \to 0} \dfrac{(x+1)\sin(x)}{x^2 + x}$. *[5]*

**Quiz #4.** Wednesday, 30 May, 2012. *[10 minutes]*

Do *one* (1) of questions 1 or 2.

1. Compute $\lim_{x \to \infty} \dfrac{x^2 + \cos(x)}{2x^2 + 3x}$. *[5]*
2. Let $f(x) = 3x + 2$. Use the limit definition of the derivative to show that $f'(x) = 3$. *[5]*

**Quiz #5.** Monday, 4 June 2012. *[10 minutes]*

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

**Quiz #6.** Wednesday, 6 June, 2012. *[10 minutes]*

1. A spherical balloon is blown up, with helium being pumped into it at a constant rate of $8\pi$ $m^3/s$. How is the radius of the balloon changing at the moment that the radius is $\frac{1}{2}$ $m$? *[10]* [The volume of a sphere of radius $r$ is $\frac{4}{3}\pi r^3$.]

**Quiz #7.** ~~Monday, 11~~ Wednesday, 13 June, 2012. *[10 minutes]*

1. Find the maxima and minima of $g(t) = \dfrac{t^2 - 1}{t^2 + 1}$ on the interval $[-2, 1]$. *[5]*

**Quiz #8.** Wednesday, 20 June, 2012. *[10 minutes]*

1. Compute the average slope of $f(x) = x^3 - x$ on the interval $[-1, 2]$ and find a point $c$ inside this interval such that $f'(c)$ is equal to the average slope of $f(x)$ on the interval. *[5]*

**Quiz #9.** Monday, 25 June, 2012. *[10 minutes]*

1. Compute $\displaystyle\int_0^{\pi/6} \cos(3x)\,dx$. *[5]*

**Quiz #10.** Wednesday, 27 June, 2012. *[10 minutes]*

1. Find the area between $y = x^2$ and $y = x + 2$ for $0 \leq x \leq 6$. *[5]*

**Quiz #11.** Wednesday, 4 July, 2012. *[15 minutes]*

Do *one* (1) of questions 1 or 2.

1. Sketch the region between $r = 0$ and $r = \sec(\theta)$ for $-\frac{\pi}{4} \leq \theta \leq \frac{\pi}{4}$ in polar coordinates and find its area. *[5]*
2. Sketch the solid obtained by revolving the region between $y = 0$ and $y = \sqrt{x}$ for $0 \leq x \leq 4$ about the $x$-axis and find its volume. *[5]*

**Quiz #12.** Monday, 9 July, 2012. *[10 minutes]*

1. Sketch the solid obtained by revolving the region below $y = x$ and above $y = x^2$ for $0 \leq x \leq 1$ about the $y$-axis and find its volume. *[5]*

**Quiz #13.** Wednesday, 11 July, 2012. *[12 minutes]*

1. Compute $\displaystyle\int \sec^4(x)\,dx$. *[5]*

**Quiz #14.** Wednesday, 18 July, 2012. *[15 minutes]*

Do *one* (1) of questions 1 or 2.

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

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

**Quiz #15.** Monday, 23 July, 2012. *[15 minutes]*

1. Compute $\displaystyle\int \frac{1}{x^3+x}\,dx$. *[5]*

**Quiz #16.** Wednesday, 25 July, 2012. *[15 minutes]*

Do *one* (1) of questions 1 or 2.

1. Find the arc-length of the curve given in polar coordinates by $r = \theta^2$, where $0 \leq \theta \leq \sqrt{5}$. *[5]*
2. Find the area of the surface obtained by revolving the curve $y = \frac{2}{3}x^{3/2}$, where $0 \leq x \leq 1$, about the $y$-axis. *[5]*

**Quiz #17.** Take-Home! Due on Monday, 30 July, 2012. *[5 days]*

1. A cylindrical hole is drilled through a sphere, with the centre line of the cylinder passing through the centre of the sphere. After the drilling is completed, the cylindrical hole in the remaining solid is exactly 6 *cm* high. Determine the volume of the remaining solid. *[5]*

*Hint:* The volume of the remaining solid is $36\pi\ cm^3$.

**Quiz #18.** Monday, 30 July, 2012. *[15 minutes]*

Do *one* (1) of questions 1 or 2.

1. Compute $\displaystyle\lim_{n\to\infty} \frac{\cos(n)}{n!}$. *[5]*

2. Compute $\displaystyle\sum_{n=0}^{\infty} \pi e^{-n}$.

**Quiz #19.** Wednesday, 1 August, 2012. *[15 minutes]*

Determine whether each of the following series converges or diverges.

1. $\displaystyle\sum_{n=0}^{\infty} \frac{n+2}{n^2+3n+1}$ *[2.5]*

2. $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n\ln(n)}$ *[2.5]*