Mathematics 110 – Calculus of one variable
Trent University 2003-2004

§A Quizzes

Quiz #1. Friday, 19 September, 2003. *[10 minutes]*

12:00 Seminar

1. How close does x have to be to 1 in order to guarantee that $\frac{1}{x}$ is within $\frac{1}{10}$ of 1? *[10]*

13:00 Seminar

1. Find a value of $\delta > 0$ that ensures that $-1 < \sqrt{x} - 4 < 1$ whenever $-\delta < x - 16 < \delta$. *[10]*

Leftovers

1. Use the $\varepsilon - \delta$ definition of limits to verify that that $\lim_{x \to 0} 1 = 1$. *[10]*

Hint: Try any $\delta > 0$ you like ...

Quiz #2. Monday, 29 September, 2003. *[10 minutes]*

1. Use the $\varepsilon - \delta$ definition of limits to verify that that $\lim_{x \to 0} \sin^2(x) = 0$. *[10]*

Hint: You may use the fact that $|\sin(x)| \leq |x|$.

Quiz #3. Friday, 3 October, 2003. *[15 minutes]*

12:00 Seminar

Evaluate

1. $\lim_{x \to \infty} \dfrac{x-2}{x^2 - 3x + 2}$ *[5]* 2. $\lim_{x \to 0} \dfrac{e^x - 1}{e^{2x} - 1}$ *[5]*

13:00 Seminar

Evaluate

1. $\lim_{x \to 1} \dfrac{x^2 + x - 2}{x^2 + 2x - 3}$ *[5]* 2. $\lim_{x \to \infty} \dfrac{(x+4)^2}{41x^2 + 43x + 47}$ *[5]*

Leftovers

1. For what value(s) of the constant c does $\lim_{x \to 2}(cx + 3) = \lim_{t \to \infty} \dfrac{ct^2 + 3 + c}{t^2 + 1}$? *[10]*

Quiz #4. Friday, 10 October, 2003. *[10 minutes]*

12:00 Seminar

1. Use the limit definition of the derivative to find $f'(0)$ if $f(x) = (x+1)^3$. *[10]*

13:00 Seminar

1. Use the limit definition of the derivative to find $f'(x)$ if $f(x) = \dfrac{1}{x}$. *[10]*

Leftovers

1. Use the limit definition of the derivative to find $f'(x)$ if $f(x) = x^2 - 3x$. *[10]*

Quiz #5. Friday, 17 October, 2003. *[10 minutes]*

12:00 Seminar

Find $\frac{dy}{dx}$ in each of the following:

1. $y = \ln(\sec(x) + \tan(x))$ *[3]* 2. $e^{xy} = 2$ *[3]* 3. $y = \dfrac{x^2 + 4x + 4}{x + 3}$ *[4]*

13:00 Seminar

Find $\frac{dy}{dx}$ in each of the following:

1. $y = \left(1 + x^2\right)\arctan(x)$ *[3]* 2. $\tan(x + y) = 1$ *[3]* 3. $y = \dfrac{e^x + 1}{e^{2x} - 1}$ *[4]*

Leftovers

Find $\frac{dy}{dx}$ in each of the following:

1. $y = \sqrt{1 - e^{2x}}$ *[3]* 2. $y = \dfrac{\tan(x)}{\cos(x)}$ *[3]* 3. $\ln(x + y) = x$ *[4]*

Quiz #6. Friday, 31 October, 2003. *[15 minutes]*

12:00 Seminar

1. A ladder 5 m long rests against a vertical wall. If the top of the ladder slips down at a rate of 1 m/s, how is angle between the bottom of the ladder and the ground changing when the top of the ladder is $4m$ above the ground? *[10]*

13:00 Seminar

1. A searchlight is on an island 8 km from the nearest point, call it P, on the mainland (which has a straight shore). The searchlight makes one revolution each minute. How swiftly is the light beam moving along the shore when it is 6 km from and moving towards P? *[10]*

Leftovers

1. Kypalo, walking along a straight path at 4 m/s, passes a tree 3 m from the path. How is the distance between Kypalo and the tree changing 1 s after the Kypalo passes the tree? *[10]*

Quiz #7. Friday, 7 November, 2003. *[15 minutes]*

1. Find all the intercepts, the maximum, minimum, and inflection points, and the horizontal and vertical asymptotes of the following function:

12:00: $f(x) = \dfrac{x}{x^2 + 1}$ **13:00:** $g(x) = \dfrac{x - 1}{x + 1}$ **Leftovers:** $h(x) = \dfrac{x^2 + 1}{x}$ *[10]*

Quiz #8. Friday, 21 November, 2003. *[12 minutes]*

1. Use the Right-hand Rule to compute the area under $y = f(x)$ for $0 \le x \le 2$. *[10]*

   12:00: $f(x) = (x+1)^2 - 1$ **13:00:** $f(x) = x^2 - 4x + 5$

   Leftovers: $f(x) = 2x^2 + x + 3$

   Hint: You may use the facts that

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2} \qquad \text{and} \qquad \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}\,.$$

Quiz #9. Friday, 28 November, 2003. *[12 minutes]*

1. Compute the following integrals. *[10]*

12:00:	**a.**	$\int \frac{\sin(x)}{\cos^2(x)}\,dx$	**b.**	$\int \frac{\sqrt{\ln(x)}}{6x}\,dx$
13:00:	**a.**	$\int \frac{\sin\left(\sqrt{x}\right)}{4\sqrt{x}}\,dx$	**b.**	$\int \left(\sin^2(x)\cos(x) + \cos(x)\right)\,dx$
Leftovers:	**a.**	$\int \frac{4\arctan^3(x)}{1+x^2}\,dx$	**b.**	$\int \left(e^x - 1\right)^2 e^x\,dx$

Quiz #10. Friday, 5 December, 2003. *[10 minutes]*

1. Compute the following integral. *[10]*

12:00: $\displaystyle\int_0^{\pi/4} \tan(x)\ln\left(\sec(x)\right)\,dx$ **13:00:** $\displaystyle\int_0^1 \frac{(x-1)^2}{x^2+1}\,dx$

Leftovers: $\displaystyle\int_0^1 \left(x^2+1\right)^{15} x^3\,dx$

Quiz #11. Friday, 9 January, 2004. *[12 minutes]*

1. Compute the following integral. *[10]*

12:00: $\displaystyle\int \sin(2x)\sin(x)\,dx$ **13:00:** $\displaystyle\int \left(\tan^2(x) - 1\right)\,dx$

Leftovers: $\displaystyle\int \sec^{3/2}(x)\tan(x)\,dx$

Quiz #12. Friday, 16 January, 2004. *[15 minutes]*

1. Compute the following integral. *[10]*

12:00: $\displaystyle\int \frac{\sqrt{x^2-4}}{x^2}\,dx$ **13:00:** $\displaystyle\int_0^2 x\sqrt{4-x^2}\,dx$

Leftovers: $\displaystyle\int \frac{x^3}{\sqrt{x^2+9}}\,dx$

Quiz #13. Friday, 23 January, 2004. *[15 minutes]*

1. Compute the following integral. *[10]*

12:00: $\displaystyle\int \frac{5}{(x-1)\left(x^2+2x+2\right)}\,dx$ **13:00:** $\displaystyle\int \frac{4}{\left(x^2-1\right)(x-1)}\,dx$

Leftovers: $\displaystyle\int \frac{x^2-2x+1}{x^2-x-2}\,dx$

Quiz #14. Monday, 2 February, 2004. *[15 minutes]*

Lecture

1. Find the volume of the solid obtained by rotating the region bounded by $y = x^3$, $y = 0$, and $x = 1$ about the y-axis. *[10]*

Leftovers

1. Find the volume of the solid obtained by rotating the region bounded by $y = \cos(x)$ and $y = 0$ for $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$ about the y-axis. *[10]*

Quiz #15. Friday, 6 February, 2004. *[15 minutes]*

12:00

1. Find the area of the surface obtained by rotating the curve $y = \frac{x^3}{3}$, $0 \leq x \leq 1$, about the x-axis. *[10]*

13:00

1. Find the arc-length of the curve $y = -\ln(\cos(x))$, $0 \leq x \leq \frac{\pi}{4}$. *[10]*

Leftovers

1. Find the area of the surface obtained by rotating the curve $y = \ln(x)$, $1 \leq x \leq e$, about the y-axis. *[10]*