

# *Are you ready for university* **Calculus?**



## Take the Test

*The U1 Student Help Centre and  
the Department of Mathematics*

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### **The Test**

Even though you must have a minimum of 60% in Math 40S Pre-calculus in order to enrol in introductory university calculus courses, many students who meet this prerequisite find themselves under prepared and have difficulty with the course.

This self-scored test is designed by the Department of Mathematics for you to assess your readiness for the introductory calculus courses 136.150, 136.151, 136.152, 136.168, and 136.169. If you intend to register in any of these courses, you should take this test and score it yourself using the Answer Key provided (see back of sheet).

### **Scoring**

Be honest! If you peek at the answers, your performance on this test will not tell you if you are prepared for university calculus. The test is divided into five parts. A score of less than 3 out of 5 for any part indicates a weakness in that particular area. Depending on your overall score and how many areas you are weak in, you may want to consider taking a remedial math course or registering in a Developmental section of a calculus course. If your overall score is below 60%, you should consider upgrading your skills by taking *Mathematical Skills*, a non-credit course offered by Continuing Education, prior to taking introductory calculus.

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### **Mathematical Skills**

You will learn to apply mathematical skills to both elementary and computationally complicated situations, consistently and with confidence. Class format includes a review of fundamental concepts, demonstrations, problem solving, applications and regular testing, including a final examination.

Fall courses start early in September and are taught on Mondays and Wednesdays or Tuesdays and Thursdays in the evenings from 7:00 – 9:00 p.m.

Registration for this course is **not** done through UMREG.

For Registration Information call 474-8016

For Program Information call 474-6661 or 474-6680  
or toll free in Manitoba 1-888-216-7011 ext. 6661

**Apply early as enrolment is limited.**

### **Developmental sections in calculus courses**

Developmental sections are offered in calculus courses 136.150 and 136.152. Check the *Registration Guide* for details. Students in these sections will receive an extra hour of teaching each week. Students will learn the same material as in other sections and will write the same mid-term and final examination.

### **Developmental sections in algebra courses**

A developmental section is also available in 136.131 - Matrices for Management and Social Sciences. Check the *Registration Guide* for details.

### **The Math Help Centre**

The Math Help Centre, in Room 318 Machray Hall, is open during the regular session. Senior math students can assist you in understanding concepts and specific problems you may be having difficulty with in your calculus course.

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***Are you ready for university Calculus?***

## PART A – ALGEBRAIC MANIPULATION

Simplify the expressions (1) through (4):

1.  $x(2x + 3(x - (2x + 1)))$

2. 
$$\frac{x + \frac{1}{y}}{y + \frac{1}{x}}$$

3. 
$$\left(x + \frac{1}{3}y\right)\left(\frac{1}{4}x - y\right) - \left(\frac{2}{3}x - y\right)\left(x - \frac{3}{2}y\right)$$

4. 
$$\frac{(9x^2 + 3x - 2)}{(9x^2 - 1)} \cdot \frac{(3x^2 + 13x + 4)}{(27x^3 + 8)}$$

5. Rationalize the denominator and simplify  $\frac{\sqrt{x}}{\sqrt{x} + 3}$

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## PART B - SOLVING EQUATIONS

Solve the following equations for x.

6.  $1 - \frac{3}{x} = \frac{4}{5}$

9.  $\frac{x+1}{3x-1} + \frac{2x+1}{3x-2} = -1$

7.  $x^4 - 13x^2 + 36 = 0$

10.  $\sqrt{x+1} + \sqrt{x+8} = \sqrt{5x+9}$

8.  $x^3 - 4x^2 + x + 6 = 0$

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**PART C – FUNCTIONS AND GRAPHS**

11. If  $f(x) = \frac{x}{1-x}$ , find  $f\left(\frac{1}{x}\right)$

13. If  $f(x) = \frac{x}{1+x}$ , find  $f(x-1)$

12. If  $f(x) = 3x + 2$  and  $g(x) = 2 - x$ ,  
find  $f(g(x))$

14. Sketch the graph of  $y = x^2 - 2x$

15. Sketch the graph of  $y = x + \frac{1}{x}$

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**PART D – EXPONENTS AND LOGARITHMS**

Simplify expressions (16) and (17):

16.  $(3a^2b)^2(2ab^4)^3 \div (ab^2)^3$

18. Solve for x:  $\log_3(x-1) = 2$

17.  $\left(x^{1/2} + y^{1/3}\right) \cdot \left(x^{1/3} - y^{1/2}\right)$

19. Solve for x:  $3^x \cdot 3^{x+1} = 9$

20. Evaluate  $2 \log_2 4 + \frac{1}{2} \log_2 5 - \frac{1}{2} \log_2 20$

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**PART E – TRIGONOMETRY**

21. If  $0 < \theta < \frac{\pi}{2}$  and  $\sin \theta = \frac{12}{13}$ , then find  $\cos \theta$

22. If  $\frac{\pi}{2} < \theta < \pi$  and  $\sin \theta = \frac{5}{13}$ , then  $\cos \theta = ?$

23.  $\sin \frac{7\pi}{6} = ?$

24. Find all  $\theta$  for which  $\cos 2\theta = -\frac{1}{2}$

25. Find all  $\theta$  for which  $2 \sin^2 \theta - \cos \theta = 1$

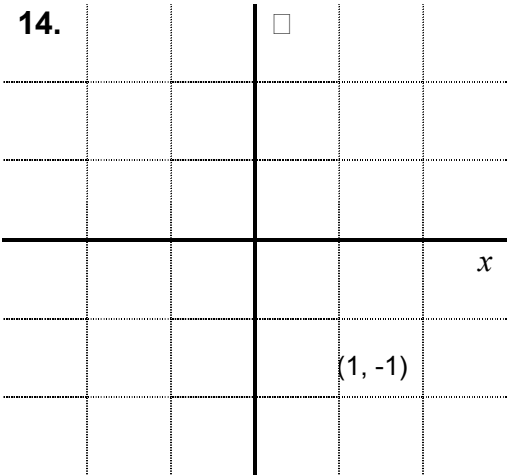
**Part A:**      1.  $-x^2 - 3x$                       2.  $\frac{x}{y}$                       3.  $-\frac{5}{12}x^2 + \frac{13}{12}xy - \frac{11}{6}y^2$

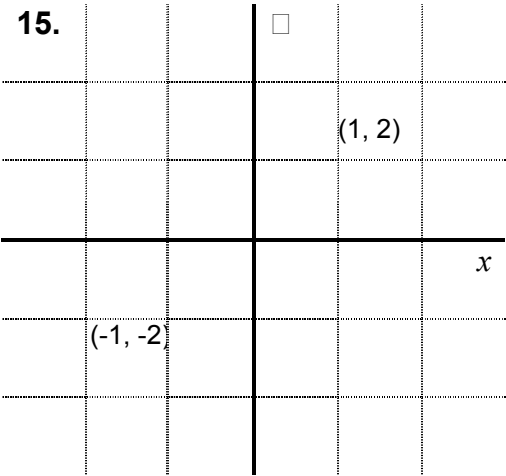
4.  $\frac{x+4}{9x^2-6x+4}$                       5.  $\frac{x-3\sqrt{x}}{x-9}$                       **Part A Score** \_\_\_\_\_ / 5

**Part B:**      6. 15                      7.  $\pm 2, \pm 3$                       8. -1, 2, 3

9.  $-\frac{1}{9}, \frac{1}{2}$                       10. 8                      **Part B Score** \_\_\_\_\_ / 5

**Part C:**      11.  $\frac{1}{x-1}$                       12.  $8-3x$                       13.  $\frac{x-1}{x}$

14. 

15. 

**Part C Score** \_\_\_\_\_ / 5

**Part D:**      16.  $72a^4b^8$                       17.  $x^{5/6} - x^{1/2}y^{1/2} + x^{1/3}y^{1/3} - y^{5/6}$                       18. 10

19.  $\frac{1}{2}$                       20. 3                      **Part D Score** \_\_\_\_\_ / 5

**Part E:**      21.  $\frac{5}{13}$                       22.  $-\frac{12}{13}$                       23.  $-\frac{1}{2}$

24.  $\frac{\pi}{3} + n\pi, \frac{2\pi}{3} + n\pi$                       25.  $\frac{\pi}{3} + 2n\pi, \frac{5\pi}{3} + 2n\pi, \pi + 2n\pi$   
 (where  $n$  is an integer)                      (where  $n$  is an integer)

**Part E Score** \_\_\_\_\_ / 5

**Total Score** \_\_\_\_\_ / 25