

FINAL is in PKH 319, 3:00-5:30 pm, on Sat May 6

- The sections covered on the FINAL are the same as that covered on the homework and on the worksheets: sections 2.1-5.5 and 5.8.

Review session: Fri May 5, 1-3pm, PKH 102

Free Math Clinic Review is \_\_\_\_\_ (check board in math clinic)

- If you get below 50 on the FINAL (or do not take it), then you cannot get a C or above in the course.
- Ken and I are available in our office hours. I will also be available Fri May 5, 3:00-5:00 pm, in PKH 421, in case you have questions.
- This FINAL will be, in part, multiple choice. Half of the points will be for the multiple-choice part, and the other half for the show-your-work part. There will be 5 choices of answer per multiple-choice question and, for each, only one answer will be the correct one. You should do rough work on the FINAL or on paper provided by me. You should bring with you to the FINAL a scantron form,

882-ES or 882-E, a number-2 pencil, an allowed graphing calculator & photo ID.

- A good (and usually effective!) way to review is to go over the homework problems you have not already done and make sure you understand all the homework well, the worksheets well and the quizzes well. I also recommend that you look through the Final exams for Fall 2003 & Spring 2004 which are posted at

[www.uta.edu/faculty/retakh/1426/exams.html](http://www.uta.edu/faculty/retakh/1426/exams.html)

I recommend that you time yourself while working on those tests, without access to your notes! In addition, this information sheet provides some more practice problems; you will spend Wed May 3 working on these questions individually (or in groups) in class. These practice questions do NOT form a model for the FINAL and are intended only to help you identify any gaps in your understanding. I also recommend that you redo Midterms 1 & 2, while timing yourself, to practice a test atmosphere and stress.

In the last 48 hours before the Final, reread ALL the homework problems including the worksheet questions, skim through the lecture notes, go again over the quizzes, these practice questions again, and Midterms 1 & 2.

- Learn some basic trigonometric substitutions, quadratic formula, pythagorean formula and formulas from this class. Learn some simple graphs, such as those given on Page 27 of your book.
- Bring with you to the FINAL a working calculator (with working batteries!), satisfying the criteria on the syllabus, and some form of photo ID. In particular, calculators with keyboards or with internet capability are not permitted on the FINAL. Cell phones should be out of sight and switched off.
- If you wish to leave the room during the FINAL, you should ask permission first & turn in your FINAL to me. Only in exceptional circumstances will I let you continue the FINAL should you return. (So it is better to be 3 minutes late to the FINAL, rather than ask to go to the bathroom during the FINAL.) If you finish early but prefer to stay in the room, then you should NOT get out any work, book nor item, no matter what the subject matter is. Should you wish to leave the FINAL early, then you may.
- It is your responsibility to be on time.
- If you wish to know your grade early, send me an e-mail that includes the following:
  - (a) Your full name
  - (b) The last 4 digits of your ID number
  - (c) Grade on final =
  - (d) Grade in class =

## PRACTICE QUESTIONS

1. Rework practice questions from the information sheets for Midterms 1 & 2. Go over Worksheet and Quiz questions. Rework Midterms 1 & 2.
  
2. (a) Find  $\lim_{x \rightarrow \infty} (x \ln(1 + x^{-1}))$ . Justify all steps in your work. (b) Using (a), find  $\lim_{x \rightarrow \infty} (1 + x^{-1})^x$ .
  
3. A rectangular swimming pool is to be built with an area of 1800 square feet. Additionally, the owner wants 5-foot wide decks along either side of the pool and 10-foot wide decks at the two ends. Draw a labelled picture depicting this situation and find the dimensions of the smallest piece of property on which the pool and decks can be built that satisfies these conditions. (Of course, you should justify that the dimensions you give are indeed for the smallest piece of property.)
  
4. Find two numbers whose product is a minimum, given that one of the numbers is nine less than one-fifth of the other. Fully justify your answer mathematically.
  
5. Compute  $\lim_{x \rightarrow 0} \left( \frac{1 - \cos kx}{x^2} \right)$ , where  $k$  is any nonzero real number.  
 (a)  $2k^2$  (b)  $\frac{2}{k^2}$  (c)  $k^2$  (d) 0 (e)  $\frac{k^2}{2}$ .
  
6. If  $x \cos y + y \cos x = 1$ , then the value of  $\frac{dy}{dx}$  at  $(0, 1)$  is  
 (a)  $-1$  (b)  $-\cos 1$  (c)  $\frac{\sqrt{2}}{2}$  (d) does not exist (e) not enough information given.
  
7. If  $x \cos y + y \cos x = 1$ , find the value of  $\frac{dx}{dt}$  if  $y = 0$  and  $\frac{dy}{dt} = \frac{1}{\cos 1}$ .  
 (a) 0 (b)  $e$  (c)  $-1$  (d)  $\frac{32\sqrt{2}}{5}$  (e) does not exist.
  
8. All the critical numbers of  $g(t) = \sqrt{t}(1 - t)$  are (a) 0 (b)  $0$  &  $\frac{1}{3}$  (c)  $0$  &  $1$  (d)  $\frac{1}{3}$  (e)  $1$ .
  
9. If a function  $f$  has derivative  $f'(x) = (1 - x)^{-\frac{3}{5}}(5 - 7x)$ , then  $f$  has a local maximum at  
 (a) 0 (b) 1 (c)  $\frac{5}{7}$  (d) does not exist (e) not enough information given.
  
10. A function  $f$  has derivative  $f'(x) = (x - 2)^3(5x - 2)$  and second derivative  $f''(x) = 4(x - 2)^2(5x - 4)$ . Find the  $x$ -coordinate(s) of the inflection point(s) of the original function  $f$ .  
 (a) 0.8, 2 (b)  $\sqrt{\frac{3}{5}}$  (c) 2,  $\sqrt{\frac{3}{5}}$  (d)  $\frac{2}{5}$ , 2 (e) 0.8.

11. Evaluate  $\lim_{x \rightarrow \infty} \left( \frac{\ln x}{x} \right)$ .  
 (a) 0      (b)  $\frac{1}{2}$       (c) 1      (d) does not exist      (e) not enough information given.
12. Evaluate  $\lim_{x \rightarrow 0} \left( \frac{\tan x}{x + \sin x} \right)$ .  
 (a) 0      (b)  $\frac{1}{2}$       (c) 1      (d) does not exist      (e) not enough information given.
13. Given that  $g(x) = \sqrt{x^2 + 7}$  and  $g'(x) = \frac{x}{\sqrt{x^2 + 7}}$ , there is a function  $f$  with the property that  $f'(x) = g'(x)$  for all  $x$  and  $f(3) = 14$ . Find  $f(\sqrt{29})$ .  
 (a) 1      (b) 6      (c) 10      (d) 16      (e) 4.
14. One piece of the River Soda is 10 miles wide and flows from west to east. Missy Smith is at a point  $A$  on the north bank of the river. Directly across the river from Missy, on the south bank, is a point  $B$ , and Missy wishes to reach a cabin  $C$  located 5 miles down the river from  $B$ . Missy can row at 5 mph (including the effect of the current), and run at 13 mph on ground. Find the route that will take Missy the least amount of time to get from  $A$  to  $C$ .  
 (a) row to a point on the south bank that is east of  $B$  and within a mile of  $B$ , then run along the south bank to  $C$   
 (b) row directly from  $A$  to  $C$   
 (c) row directly from  $A$  to  $B$ , then run along the south bank to  $C$   
 (d) row to a point on the south bank that is west of  $C$  and within a mile of  $C$ , then run along the south bank to  $C$   
 (e) not enough information given.
15. A piece of wire 30 cm long is cut into two pieces. One piece is bent into a square and the other piece is shaped into a circle. To maximize the total area enclosed, the length of wire for the circle should be  
 (a) 0 cm      (b)  $\frac{30\pi}{4 + \pi}$  cm      (c) 30 cm      (d) does not exist      (e) not enough information given.
16. A piece of wire 30 cm long is cut into two pieces. One piece is bent into a square and the other piece is shaped into an equilateral triangle. To minimize the total area enclosed, the length of wire for the triangle should be  
 (a) 0 cm      (b)  $\frac{270}{9 + 4\sqrt{3}}$  cm      (c) 30 cm      (d) does not exist      (e) not enough information given.
17. A function  $f$  has derivative  $f'(x) = 24x^5 + 2$ . Given that  $f(1) = 8$ , find  $f(-1)$ .  
 (a) 4.3      (b) 4      (c)  $-4$       (d) not enough information given      (e) none of these.
18. Compute  $\sum_{k=1}^n (3k^2 - (2n+1)k)$ .  
 (a)  $\frac{n(n+1)}{3}$       (b)  $\frac{n(n+1)}{2}$       (c) 0      (d)  $\frac{n(2n+1)}{3}$       (e)  $\frac{n(2n+1)}{2}$

19. A stone is flung vertically downwards from the top of a cliff with an initial velocity of 10 m/s. If the stone hits the ground with a speed of 59 m/s, how high is the cliff? You may assume acceleration due to gravity is  $9.8 \text{ m/s}^2$  downwards, that the stone lands at the base of the cliff and that air resistance is negligible.

- (a) 3.0 m      (b) 52.8 ft      (c) 52.8 m      (d) 172.5 ft      (e) 172.5 m.

20. Give an expression in terms of a limit that gives the area between the graph of  $y = x^3$ , the  $x$ -axis and the lines  $x = 1$  and  $x = 7$ .

- (a)  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(1 + \frac{7i}{n}\right)^3 \frac{7}{n}$       (b)  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(1 + \frac{8i}{n}\right)^3 \frac{8}{n}$       (c)  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(1 + \frac{6i}{n}\right)^3 \frac{6}{n}$   
 (d) no such limit exists      (e) none of these.

21. If  $\int_{-2}^1 f(x) dx = 1$  and  $\int_{-2}^7 f(x) dx = 5$ , what is the value of  $\int_1^7 f(x) dx$ ?

- (a)  $-8$       (b)  $-2$       (c)  $8$       (d)  $2$       (e) not enough information is given.

22. Suppose the combined population of coyotes and roadrunners is increasing at a rate of  $150 + 45t$  per year (where  $t$  is measured in years). Find an expression that gives the population's increase between the fifth and ninth years.

- (a)  $\int_5^9 (150 + 45t) dt$       (b)  $150 + \int_5^9 45t dt$       (c)  $\int_5^{10} (150 + 45t) dt$   
 (d)  $\int_5^9 45t dt$       (e)  $\frac{d}{dt} \left( \int_5^9 (150 + 45t) dt \right)$ .

23. The value of  $\frac{d}{dx} \int_{-1}^x \sqrt{t^3 + 1} dt$  at  $x = 2$  is

- (a)  $\sqrt{t^3 + 1} - 1$       (b)  $1$       (c)  $2$       (d)  $3$       (e) undefined.

24. Find  $\frac{d}{dx} \left( \int_1^{x^2} e^{t^2} dt \right)$ .      (a)  $2xe^{x^4}$       (b)  $2x^2e^{x^4}$       (c)  $e^{x^4} - e$       (d)  $e^{t^4}$       (e) indeterminate.

25. The value of  $\frac{d}{dx} \int_x^2 \cos(t^2) dt$  at  $x = \sqrt{\frac{\pi}{3}}$  is

- (a)  $-\sin(x^2)$       (b)  $-\frac{\sqrt{3}}{2}$       (c)  $\frac{\pi}{3}$       (d)  $-\frac{1}{2}$       (e) undefined.

26. The value of  $\int_0^2 \frac{e^x}{e^x + 1} dx$

- (a)  $\ln \left( \frac{e^2 + 1}{2} \right)$       (b)  $2$       (c)  $\frac{e^2}{e^2 + 1} - \frac{1}{2}$       (d)  $\ln 2 - \ln 0$       (e) none of these.

27. The value of  $\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$  is (a)  $\frac{e^2}{2} - e$  (b) 6 (c)  $\frac{e^{\sqrt{x}}}{2\sqrt{x}}$  (d)  $2e(e-1)$  (e) none of these.

28. If  $a > 0$ , then the value of  $\int_{-a}^a x\sqrt{a^2+x^2} dx$  is  
(a) 0 (b)  $-\frac{2}{3}a^{\frac{3}{2}}$  (c)  $\frac{2}{3}a^{\frac{3}{2}}$  (d) undefined (e) none of these.

29. The value of  $\int_0^a x\sqrt{a^2-x^2} dx$  is  
(a)  $-\frac{1}{3}|a|^3$  (b)  $-\frac{1}{3}|a|^{\frac{3}{2}}$  (c)  $\frac{1}{3}|a|^{\frac{3}{2}}$  (d)  $\frac{1}{3}|a|^3$  (e) none of these.

You should also look over your old quizzes, worksheet questions, the homework assigned from the book, Midterms 1 & 2, the practice questions from the information sheets for Midterms 1 & 2, and the homework assigned from the book.

Also look over the supplemental problems and the Finals from Fall 2003 & Spring 2004 which are posted at

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