

MATH 75B

Final Exam - Version 2

May 16, 2011

Name: _____

- Please turn off your cell phones and any other electronic devices.
- Write your name both on the exam and on the scantron form. Also please write the exam version in the field “TEST NO.”
- No notes, books, or calculators are allowed.
- You may write on the exam. If you need additional scratch paper, the instructor has some.
- You have to turn in your scantron form and all your scratch paper. You may keep the exam.

1. Differentiate $f(x) = \arctan(2x^2)$.

- (a) $\frac{x}{1+x^4}$
- (b) $\frac{1}{1+4x^4}$
- (c) $\frac{4x}{1+4x^4}$
- (d) $\frac{1}{1+x^3}$
- (e) $\frac{2}{1+x^4}$

2. How many absolute maximum and minimum points does $x^3 - 3x + 1 = 0$ have?

- (a) none
- (b) 1
- (c) 2
- (d) 3
- (e) none of the above

3. Evaluate the integral: $\int \frac{1}{\sqrt{x}} dx$

- (a) $\sqrt{x} + C$
- (b) $2\sqrt{x} + C$
- (c) $\frac{2}{3}\sqrt{x^3} + C$
- (d) $\frac{2}{3x^{\frac{3}{2}}} + C$
- (e) none of the above

4. A particle moves along a straight line so that its velocity is $v(t) = \sqrt{t+1}$. Find its displacement during the time interval $[0, 3]$.

- (a) 0
 - (b) $-\frac{7}{3}$
 - (c) $\frac{7}{3}$
 - (d) $-\frac{14}{3}$
 - (e) $\frac{14}{3}$
-

5. Find the domain of the function $f(x) = \sqrt{\frac{2}{x-3}}$.

- (a) $x = 3$
 - (b) $x \neq 0$
 - (c) $x \neq 3$
 - (d) $x \geq 3$
 - (e) $x > 3$
-

6. Evaluate $\lim_{x \rightarrow 3} \frac{x^2 - x - 6}{x^2 - 9}$.

- (a) 0
 - (b) 1
 - (c) $\frac{5}{6}$
 - (d) ∞
 - (e) $-\infty$
-

7. Evaluate $\arcsin(\sin(0.8\pi))$.

- (a) -1.2π
 - (b) -1.8π
 - (c) 0.2π
 - (d) 1.8π
 - (e) none of the above
-

8. Which of the following statements is true about the function $y = \ln x$?

- (a) Its value is always positive
- (b) It is decreasing
- (c) Its graph is concave downward
- (d) It is defined everywhere except $x = 0$
- (e) Its graph has no intercepts

9. Find the slope of the tangent line to the curve $3x - xy + y^4 = 3y$ at the point $(-10, 2)$.

- (a) -13
- (b) $-\frac{1}{39}$
- (c) 0
- (d) $\frac{1}{3}$
- (e) 16

10. The size of a bacteria population at $t = 0$ is 60. Its size at $t = 2$ is 240. What is its size at $t = 5$?

- (a) 510
- (b) $450 \ln 2$
- (c) $180e^{\frac{5}{2}}$
- (d) 1920
- (e) none of the above

11. How many local maxima does the graph of $y = 3 + \cos(2x)$ have?

- (a) 0
- (b) 1
- (c) 2
- (d) 3
- (e) infinitely many

12. Find the absolute maximum value of the function $y = x^3 - 12x + 4$ on the interval $[-1, 4]$.

- (a) -12
- (b) 0
- (c) 2
- (d) 15
- (e) 20

13. Evaluate $\sin(\arccos(-\frac{3}{5}))$.

- (a) $-\frac{4}{5}$
- (b) $-\frac{3}{5}$
- (c) $\frac{1}{5}$
- (d) $\frac{2}{5}$
- (e) none of the above

14. How many inflection points does the graph of $y = x^4 - 4x^3 + 6x^2 - 8x + 10$ have?

- (a) 0
- (b) 1
- (c) 2
- (d) 3
- (e) 4

15. Find the average value of $f(x) = x \cos x$ on $[-\pi, \pi]$

- (a) -2
- (b) $-\frac{\pi}{2}$
- (c) 0
- (d) 1
- (e) π

16. Evaluate $\int_0^1 4x \sin(x^2 - 1) dx$.

- (a) 0
- (b) 1
- (c) $4 \cos(1)$
- (d) $2 \cos(1) - 2$
- (e) $2 \cos(-1) + 2$

17. If we use Newton's method to approximate the root of the equation $x^3 + 4x - 3 = 0$ starting with $x_1 = 1$, then $x_2 =$

- (a) $-\frac{5}{2}$
- (b) $\frac{5}{7}$
- (c) $\frac{1}{2}$
- (d) $\frac{9}{7}$
- (e) none of the above

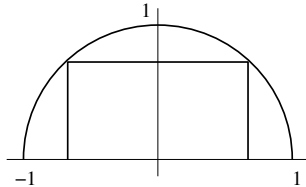
18. Evaluate $\int_0^3 \sqrt{9 - x^2} dx$

- (a) 1.5π
- (b) 2.25π
- (c) 3π
- (d) $9\pi^2$
- (e) none of the above

19. Find the horizontal asymptote for the graph of the function $f(x) = \frac{6x^2 + 5x - 3}{x^2 + 2x^2 + 1}$.

- (a) $x = -1$
- (b) $x = 0$
- (c) $y = -3$
- (d) $y = 0$
- (e) $y = 6$

20. Find the height of the rectangle enclosing the largest possible area that can be inscribed in a semicircle of radius 1 as pictured.



- (a) $\frac{1}{2}$
- (b) $\frac{3}{4}$
- (c) $\frac{1}{\sqrt{3}}$
- (d) $\frac{1}{\sqrt{2}}$
- (e) $\frac{\sqrt{3}}{2}$

-
21. The height of a triangle is increasing at a rate of 1 cm/min while the area of the triangle is increasing at a rate of 2 cm²/min. At what rate is the base of the triangle changing when the height is 10 cm and the area is 100cm²?

- (a) -1.6 cm/min
- (b) -0.8 cm/min
- (c) 0.4 cm/min
- (d) 1.2 cm/min
- (e) none of the above

-
22. If $\int_0^2 f(x)dx = 8$ and $\int_2^5 f(x)dx = 4$, find $\int_0^5 f(x)dx$.

- (a) -4
- (b) 0
- (c) 4
- (d) 12
- (e) 32

23. Which of the following is an antiderivative of $2x + 3 \cos x + 4 \sin x$?

- (a) $2 - 3 \sin x + 4 \cos x$
- (b) $2 - 3 \sin x + 4 \cos x + C$
- (c) $x^2 + 3 \sin x - 4 \cos x$
- (d) $x^2 - 3 \sin x + 4 \cos x$
- (e) $x^2 + 3 \sin x + 4 \cos x + C$

24. Evaluate $\lim_{x \rightarrow 0} \arccos(x)$

- (a) 0
- (b) $\frac{\pi}{2}$
- (c) π
- (d) 2π
- (e) none of the above

25. Which of the following is equal to the area under the curve $y = |x - 4|$ between $x = 0$ and $x = 6$?

- (a) $\int_0^6 (x - 4) dx$
- (b) $-\int_0^6 (x - 4) dx$
- (c) $\int_4^6 (x - 4) dx$
- (d) $\int_0^4 (x - 4) dx + \int_4^6 (4 - x) dx$
- (e) $\int_0^4 (4 - x) dx + \int_4^6 (x - 4) dx$