MAT 127 Early Exam

September 15, 2010
8:30-10:00pm

DO NOT OPEN THIS EXAM YET

Instructions

$$\boxed{\text{Mark your answers CLEARLY on the provided answer sheet}}$$

(1) Fill in your name and Stony Brook ID number and circle your lecture number on the provided answer sheet.

(2) This exam is closed-book and closed-notes; no calculators, no phones.

(3) There are 20 multiple-choice questions on the exam of varying difficulty; each correct answer is worth 1 point.

(4) Mark your answer CLEARLY on the provided answer sheet by circling ONE letter per line. If there is any ambiguity in what letter you circled, you will not receive any credit for the question.

(5) You can write on the exam, but only your answers on the provided answer sheet will be graded. If you need more blank paper, ask a proctor.

(6) Do not rush through the exam. While you may find some questions easy, each is worth 5% of the score on this exam. Double-check your work before you decide to leave early.

(7) Once the time is called (or if you finish early), please hand in the answer sheet and sign under your name on the photo roster at the front of the room. You can keep the exam questions.

Out of fairness to others, please **stop working and close the exam as soon as the time is called**. A significant number of points will be taken off your exam score if you continue working after the time is called. You will be given a two-minute warning before the end.

1. $\dfrac{2}{4^{-1}}$ equals

(A) $\dfrac{1}{4}$ (B) $\dfrac{1}{2}$ (C) 2 (D) 4 (E) 8

2. $\dfrac{1}{4^n - 2^n}$ equals

(A) $\dfrac{1}{2}$ (B) $\dfrac{1}{2^n}$ (C) $\dfrac{1}{4^n} - \dfrac{1}{2^n}$ (D) $\dfrac{1}{2^n - 1} - \dfrac{1}{2^n}$ (E) $\dfrac{1}{2^n - 1}$

3. The quadratic equation $x^2 - 6x - 3 = 0$ has two distinct roots. Their sum and product are

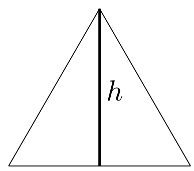
(A) -6 and -3 (B) 6 and 3 (C) 6 and -3 (D) -6 and 3 (E) 3 and -6

4. The number of solutions of the system of equations $\begin{cases} 3x + 4y = 7 \\ x + \sqrt{2}y = 3 \end{cases}$ is

(A) 0 (B) 1 (C) 2 (D) 7 (E) infinite

5. The height h (length of altitude) in a triangle with all sides 1 is

(A) $\dfrac{1}{2}$ (B) $\dfrac{\sqrt{3}}{2}$ (C) 1 (D) $\dfrac{3}{2}$ (E) $\sqrt{3}$



6. The sum $1 + \dfrac{1}{2} + \dfrac{1}{4} + \dfrac{1}{8} + \ldots + \dfrac{1}{1024}$ equals

(A) 1 (B) $\dfrac{2043}{1024}$ (C) $\dfrac{2045}{1024}$ (D) $\dfrac{2047}{1024}$ (E) $\dfrac{4095}{2048}$

7. $\ln 81 - \ln 36$ equals

(A) 0 (B) 1 (C) $\ln 45$ (D) $2\ln 3 - 2\ln 2$ (E) 45

8. $\mathrm{e}^{2\ln 3}$ equals

(A) 0 (B) 1 (C) 6 (D) 8 (E) 9

9. $10^{\ln 6} - 6^{\ln 10}$ equals

(A) 0 (B) 1 (C) -1 (D) $4^{-\ln 4}$ (E) $\dfrac{1}{256}$

10. $\cos x + \cos(-x)$ equals

(A) 0 (B) 1 (C) -1 (D) $2\cos x$ (E) $\cos 2x$

11. For every number $x > 0$, the values of x, e^x, and $\ln(x)$ are all different. Which list has them ordered from smallest to largest?

(A) x, e^x, $\ln(x)$ (B) x, $\ln(x)$, e^x (C) $\ln(x)$, x, e^x (D) $\ln(x)$, e^x, x (E) e^x, x, $\ln(x)$

12. The graph of the function $y=(x-2)^3+3$ is obtained by shifting the graph of the function $y=x^3$

(A) 3 units up and 2 units left
(B) 3 units up and 2 units right
(C) 3 units down and 2 units left
(D) 3 units down and 2 units right
(E) 3 units right and 2 units down

13. $\lim\limits_{x\longrightarrow 0} \dfrac{\tan x}{x}$ equals

(A) 0 (B) $\dfrac{1}{4}$ (C) $\dfrac{1}{2}$ (D) 1 (E) ∞

14. $\lim\limits_{x\longrightarrow\infty} \dfrac{x^2}{1+\sqrt{4x^4+1}}$ equals (caution: pay attention to the underset text)

(A) 0 (B) $\dfrac{1}{4}$ (C) $\dfrac{1}{2}$ (D) 1 (E) ∞

15. $\lim\limits_{x\longrightarrow\infty} \dfrac{\sin x}{x}$ equals

(A) 0 (B) $\dfrac{1}{4}$ (C) $\dfrac{1}{2}$ (D) 1 (E) ∞

16. Which of the following equations describes the line tangent to the graph of the function

$$f(x) = (\sin x)e^{\cos x} \qquad \text{at} \quad (\pi/2, 1) \quad ?$$

(A) $y = -x + \frac{\pi}{2} + 1$ (B) $y = -x - \frac{\pi}{2} + 1$ (C) $y = x - \frac{\pi}{2} + 1$ (D) $y = x - \frac{\pi}{2}$ (E) $y = x + 1$

17. $\displaystyle\int \sin(2x)\,\mathrm{d}x$ equals

(A) $\cos 2x+C$ (B) $-\cos 2x+C$ (C) $\dfrac{1}{2}\cos 2x+C$ (D) $-\dfrac{1}{2}\cos 2x+C$ (E) $-2\cos(2x)+C$

18. $\displaystyle\int_0^\infty x\mathrm{e}^{-2x}\,\mathrm{d}x$ equals

(A) 0 (B) $\dfrac{1}{4}$ (C) $\dfrac{1}{2}$ (D) $-\dfrac{1}{2}$ (E) 1

19. $\displaystyle\int_0^5 \frac{1}{x^2+4x+3}\,\mathrm{d}x$ equals

(A) $\dfrac{1}{2}$ (B) $\dfrac{5}{16}$ (C) $\ln 3 - \ln 2$ (D) $\ln 2$ (E) $\arctan 7 - \arctan 2$

20. Which of the following statements is true?

(A) $\displaystyle\int_2^{12} x^{-3/2}\mathrm{d}x < \sum_{n=3}^{n=12} n^{-3/2} < \sum_{n=2}^{n=11} n^{-3/2}$

(B) $\displaystyle\sum_{n=3}^{n=12} n^{-3/2} < \int_2^{12} x^{-3/2}\mathrm{d}x < \sum_{n=2}^{n=11} n^{-3/2}$

(C) $\displaystyle\sum_{n=3}^{n=11} n^{-3/2} < \int_2^{12} x^{-3/2}\mathrm{d}x < \sum_{n=3}^{n=12} n^{-3/2}$

(D) $\displaystyle\sum_{n=2}^{n=12} n^{-3/2} < \sum_{n=1}^{n=11} n^{-3/2} < \int_2^{12} x^{-3/2}\mathrm{d}x$

(E) $\displaystyle\sum_{n=2}^{n=12} n^{-3/2} < \int_2^{12} x^{-3/2}\mathrm{d}x < \sum_{n=1}^{n=11} n^{-3/2}$