

Math 111 – Exam 3 – Fall 2011

No books, notes, or calculators allowed.

Do NOT write on this exam.

1. Find the exact value of $\sin^{-1}\left(-\frac{1}{2}\right)$.

- A. -1 B. $-\frac{\pi}{6}$ C. $\frac{\pi}{6}$ D. $-\frac{\pi}{3}$ E. $\frac{\pi}{3}$ F. Does not exist

2. Find the exact value of $\tan^{-1}\left(\tan\left(\frac{11\pi}{5}\right)\right)$.

- A. $-\frac{6\pi}{7}$ B. $-\frac{11\pi}{5}$ C. $\frac{11\pi}{5}$ D. $-\frac{\pi}{5}$ E. $\frac{\pi}{5}$ F. Does not exist

3. Solve the following equation for x : $6 \sin^{-1}(x) = 9\pi$

- A. $-\frac{\sqrt{3}}{3}$ B. $\sqrt{3}$ C. 1 D. 0 E. $\frac{\sqrt{3}}{2}$ F. -1

4. Find the exact value of $\sin\left(\cos^{-1}\left(-\frac{4}{7}\right)\right)$.

- A. $-\frac{\sqrt{33}}{4}$ B. $-\frac{\sqrt{33}}{7}$ C. $-\frac{4}{7}$ D. $\frac{\sqrt{33}}{7}$ E. $\sqrt{33}$ F. None of these

5. Find the exact value of $\sec\left(\sin^{-1}\left(\frac{1}{4}\right)\right)$.

- A. $\frac{4\sqrt{15}}{15}$ B. $\frac{\sqrt{15}}{4}$ C. $\sqrt{15}$ D. 4 E. $-\frac{1}{4}$ F. None of these

6. Write the trigonometric expression $\csc(\tan^{-1}(u))$ as an algebraic expression in u .

- A. $\frac{1}{\sqrt{u^2+1}}$ B. $\frac{1}{\sqrt{1-u^2}}$ C. $\sqrt{u^2+1}$ D. $\frac{\sqrt{u^2+1}}{u}$ E. $\frac{\sqrt{u^2-1}}{u}$ F. None of these

7. Write the trigonometric expression $\csc(\sin^{-1}(u))$ as an algebraic expression in u .

- A. $\frac{1}{\sqrt{1-u^2}}$ B. $\sqrt{1-u^2}$ C. u D. $\frac{1}{u}$ E. $\frac{\sqrt{u^2-1}}{u}$ F. None of these

8. Rewrite the expression $\cot \theta \cdot \tan \theta$ in terms of sine and cosine and then simplify.

- A. 0 B. 1 C. $\frac{1}{\sin \theta}$ D. $\frac{1}{\cos \theta}$ E. $\sin \theta$ F. $\cos \theta$ F. None of these

9. Simplify the expression $\frac{\cos \theta}{\sin \theta - 1} + \frac{1 + \sin \theta}{\cos \theta}$

- A. $\frac{2}{(\sin \theta - 1)(\cos \theta)}$ B. $\frac{-2}{(\sin \theta - 1)(\cos \theta)}$ C. 0 D. 1 E. -2 F. $\cos \theta + \sin \theta$

10. Factor and simplify the expression $\frac{2\sin^2 \theta - 3\sin \theta - 5}{2\sin^2 \theta - 7\sin \theta + 5}$

- A. $\frac{\sin \theta - 5}{2\sin \theta + 1}$ B. $\frac{\sin \theta - 5}{\sin \theta + 1}$ C. $\frac{3}{7}$ D. $\frac{\sin \theta + 1}{\sin \theta - 1}$ E. -1 F. None of these

11. Use a sum or difference formula to find the value of $\sin(165^\circ)$.

- A. $\frac{\sqrt{6} - \sqrt{2}}{2}$ B. $\frac{\sqrt{6} - \sqrt{2}}{4}$ C. $\frac{\sqrt{6} + \sqrt{2}}{2}$ D. $\frac{\sqrt{6} + \sqrt{2}}{4}$ E. $\frac{-\sqrt{6} + \sqrt{2}}{4}$ F. None of these

12. Find the exact value of the expression $\cos\left(\frac{\pi}{9}\right)\cos\left(\frac{4\pi}{9}\right) + \sin\left(\frac{\pi}{9}\right)\sin\left(\frac{4\pi}{9}\right)$.

- A. $\sin\left(\frac{5\pi}{9}\right)$ B. $\frac{\sqrt{3}}{2}$ C. 1 D. $\frac{1}{2}$ E. $\cos\left(\frac{5\pi}{9}\right)$ F. None of these

13. Find the exact value of the expression $\sin\left(\sin^{-1}\left(-\frac{12}{13}\right) - \tan^{-1}\left(\frac{3}{4}\right)\right)$.

- A. $-\frac{63}{65}$ B. $-\frac{33}{65}$ C. $-\frac{56}{65}$ D. $\frac{63}{65}$ E. $-\frac{16}{65}$ F. None of these

14. Find the exact value of $\cos\left(2\cos^{-1}\left(\frac{3}{4}\right)\right)$.

- A. $-\frac{3}{8}$ B. $\frac{3}{8}$ C. $-\frac{1}{8}$ D. $\frac{1}{8}$ E. $\frac{-3\sqrt{7}}{8}$ F. None of these

15. If $\tan \theta = -\frac{3}{4}$ and $\frac{\pi}{2} < \theta < \pi$, find the exact value of $\sin^2\left(\frac{\theta}{2}\right)$.

- A. $\frac{4}{5}$ B. $\frac{3}{5}$ C. $\frac{1}{10}$ D. $\frac{9}{10}$ E. None of these

16. Express the product $\cos\left(\frac{7\theta}{2}\right)\cos\left(\frac{3\theta}{2}\right)$ as a sum containing only sines or only cosines.

- A. $\frac{1}{2}[\cos(7\theta)]$
- B. $\frac{1}{2}[\cos(2\theta) - \cos(5\theta)]$
- C. $\frac{1}{2}[\cos(2\theta) + \cos(5\theta)]$
- D. $\frac{1}{2}[\sin(2\theta) + \sin(5\theta)]$
- E. None of these

17. Determine the total number of solutions for the equation $4(1 + \sin(\theta)) = \cos^2 \theta$ on $[0, 2\pi)$.

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4
- F. None of these

18. Determine the total number of solutions for the equation $2\sin^2(2\theta) - 3\sin(2\theta) + 1 = 0$ on $[0, 2\pi)$.

- A. 0
- B. 1
- C. 2
- D. 4
- E. 6
- F. None of these

19. Solve the equation $2\cos(\theta) + 1 = 0$ on the interval $[0, 2\pi)$. Give the sum of all of these solutions.

- A. 2π
- B. $\frac{\pi}{3}$
- C. 3π
- D. π
- E. $\frac{2\pi}{3}$
- F. None of these

20. Solve the equation $\sin \theta = -\sqrt{3}\cos \theta$ on the interval $[0, 2\pi)$. Give the sum of all of these solutions.

- A. $\frac{5\pi}{3}$
- B. $\frac{2\pi}{3}$
- C. π
- D. $\frac{8\pi}{3}$
- E. $\frac{7\pi}{3}$
- F. None of these

Answers:

1. B
2. E
3. F
4. D
5. A
6. D
7. D
8. B
9. C
10. D
11. B
12. D
13. A
14. D
15. D
16. C
17. B
18. E
19. A
20. E