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King Fahd University of Petroleum and Minerals
College of Sciences, Prep-Year Math Program

Code 003

Math 002, Exam II
Term (001)
Tuesday, November 14, 2000
6:30 - 8:00 p.m.

Code 003

STUDENT NAME:_____

ID #:_____ SECTION #:_____

Important Instructions

Use only 6 Digits I.D. # : i.e. Remove two zeros from 2000 of your ID#
(Example: ID# 20006587 should be bubbled as 206587)

Do not put any mark on a choice of any answer on the Exam Paper

1. All types of **Calculators, Pagers or Telephones are not allowed** during the examination.
2. **Use an HB 2.5 pencil.** Any mistake in bubbling your ID number will cost you one grade point.
3. Use a good eraser. **Do not use the eraser attached to the pencil.**
4. **Write your name, ID number and Mathematics Section number** on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling **your ID number and Math Section number**, be sure that bubbles match with the number that you write.
6. The **test Code Number** is already typed and bubbled in your answer sheet. Make sure that it is **the same as that printed on your question paper.**
7. When erasing a bubble, make sure that you **do not leave any trace of pencilling.**
8. **Check** that the exam paper has **18** questions.

1. When writing $-\sin x - \sqrt{3}\cos x$ in the form $A\sin(x+\alpha)$, $0 \leq \alpha \leq 2\pi$ then:

(a) $A = 2,\ \alpha = \dfrac{7\pi}{6}$

(b) $A = 2,\ \alpha = \dfrac{4\pi}{3}$

(c) $A = 2,\ \alpha = \dfrac{2\pi}{3}$

(d) $A = 2,\ \alpha = \dfrac{5\pi}{3}$

(e) $A = 2,\ \alpha = \dfrac{11\pi}{6}$

2. The adjacent graph represents, over 1 period, the following function:

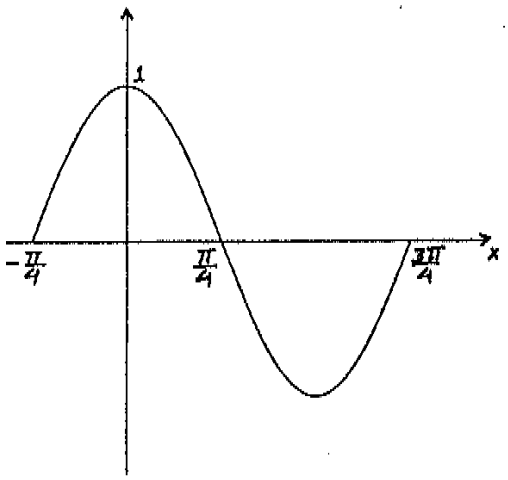
(a) $\cos\left(x + \dfrac{\pi}{4}\right)$

(b) $\sin\left(x + \dfrac{\pi}{4}\right)$

(c) $\cos\left(2x + \dfrac{\pi}{2}\right)$

(d) $\sin\left(2x + \dfrac{\pi}{2}\right)$

(e) $-\sin\left(2x + \dfrac{\pi}{2}\right)$



3. If $\cos\theta = \frac{3}{5}$, $\sin\theta < 0$, $0 \leq \theta \leq 2\pi$, then $\tan\frac{\theta}{2}$ is equal to:

(a) $-\frac{1}{2}$

(b) $\frac{1}{2}$

(c) $-\frac{4}{3}$

(d) $\frac{4}{3}$

(e) $-\frac{2}{3}$

4. $\tan 15^\circ =$

(a) $\frac{\sqrt{3}}{6}$

(b) $2 - \sqrt{3}$

(c) $2 + \sqrt{3}$

(d) $\frac{\sqrt{2+\sqrt{2}}}{2}$

(e) $\frac{\sqrt{3+\sqrt{3}}}{3}$

5. $\sin^{-1}\left(\sin\frac{4\pi}{3}\right) =$

(a) $\frac{4\pi}{3}$

(b) $\frac{2\pi}{3}$

(c) $-\frac{\pi}{3}$

(d) $\frac{\pi}{3}$

(e) $-\frac{2\pi}{3}$

6. $-\sqrt{\frac{1+\cos 378^\circ}{2}} =$

(a) $-\cos 189^\circ$

(b) $\sin 189^\circ$

(c) $-\sin 189^\circ$

(d) $-\tan 189^\circ$

(e) $\cos 189^\circ$

7. The sum of all solutions of the equation

$$\cos 2x + \cos x = 0$$

in the interval $0 \leq x \leq 2\pi$ is equal to:

(a) 2π

(b) 3π

(c) 4π

(d) 5π

(e) 6π

8. When the period of the function $y = -\frac{1}{2}\cos 4x$ is divided by its amplitude then the answer is:

(a) $-\pi$

(b) $\frac{2}{\pi}$

(c) π

(d) $-\frac{\pi}{2}$

(e) $-\frac{2}{\pi}$

9. $\dfrac{\cos(x-y)}{\cos x \sin y} - \dfrac{\tan(x+y) - \tan y}{1 + \tan(x+y)\tan y} =$

(a) $\cot y$

(b) $2\tan x + \cot y$

(c) $\tan x - \tan y$

(d) $2\tan x$

(e) $\cot x - \cot y$

10. The value of the expression

$$\cos\left(\frac{11\pi}{6}\right) - 4\sin\left(\frac{2\pi}{3}\right)$$

is equal to:

(a) $\dfrac{3\sqrt{3}}{2}$

(b) $-\dfrac{5\sqrt{3}}{2}$

(c) $-\dfrac{3}{2}$

(d) $\dfrac{5}{2}$

(e) $-\dfrac{3\sqrt{3}}{2}$

11. The equation

$$\cos^{-1}(x) + \sin^{-1}(3 + 4x) = \frac{\pi}{2}$$

has:

(a) Exactly one solution which is a negative integer

(b) Two real solutions

(c) A solution $x \in (-3, -2)$

(d) A solution $x \in (0, 1]$

(e) no solution at all

12. If $x = a$ and $x = b$ are the 2 asymptotes of $y = 4\tan\left(\frac{1}{3}x - \frac{\pi}{6}\right)$ in the interval $\left(-\frac{3\pi}{2}, \frac{5\pi}{2}\right)$ then $a + b$ is equal to:

(a) 0

(b) $-\pi$

(c) $\frac{3\pi}{2}$

(d) π

(e) $\frac{\pi}{2}$

13. The range R and period P of $f(x) = -\frac{3}{2}\csc\left(3x + \frac{\pi}{2}\right) + 1$ are:

(a) $R = \left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{5}{2}, \infty\right)$, $P = \frac{\pi}{3}$

(b) $R = \left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{5}{2}, \infty\right)$, $P = \frac{\pi}{3}$

(c) $R = \left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{5}{2}, \infty\right)$, $P = \frac{2\pi}{3}$

(d) $R = \left(-\infty, -\frac{3}{2}\right] \cup \left[\frac{3}{2}, \infty\right)$, $P = \frac{2\pi}{3}$

(e) $R = \left(-\infty, -\frac{5}{2}\right] \cup \left[\frac{1}{2}, \infty\right)$, $P = \frac{2\pi}{3}$

14. The top of a radio antenna is 100 m high from the ground. A wire 200 m long is attached to the top from the ground. The angle the wire makes with the ground is equal to:

(a) $30°$

(b) $45°$

(c) $60°$

(d) $-30°$

(e) $-60°$

15. The rectangular coordinates of the point $P\left(-\frac{31\pi}{6}\right)$ on the unit circle is:

(a) $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

(b) $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

(c) $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

(d) $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

(e) $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

16. The exact value of $\cos\left(-\frac{7\pi}{12}\right)$ is:

(a) $\frac{\sqrt{6}-\sqrt{2}}{4}$

(b) $\frac{\sqrt{6}+\sqrt{2}}{4}$

(c) $\frac{\sqrt{3}-\sqrt{2}}{2}$

(d) $\frac{\sqrt{2}-\sqrt{6}}{4}$

(e) $\frac{\sqrt{2}-\sqrt{3}}{2}$

17. In an electrical circuit if the electromotive force is given by $E(t) = 6 \sin 2t \sin\left(\frac{\pi}{2} - 2t\right)$ then the maximum value of $E(t)$ is:

(a) -3

(b) 3

(c) -6

(d) 6

(e) 2

18. The expression $\frac{\sin x}{\sec x - 1} + \frac{\sin x}{\sec x + 1}$, whenever it is defined, is equal to:

(a) $2 \tan x$

(b) $2 \tan^3 x$

(c) $\cot x$

(d) $\frac{\sin x}{2 \sec x}$

(e) $\frac{2}{\tan x}$