

Name _____ Banner: _____

yes,
do this.

Write your name and Banner here and here.

Instructions for Students using ParSCORE Test Forms

Required Materials (available at campus bookstore):

- ParSCORE Test Form – No. X-101864
- #2 Pencil

MWF	10:00 AM	→	1093.002
TTH	8:00 AM	→	1093.005
TTH	2:00 PM	→	1093.008

Separate the pages of the exam and use the back of the paper as scratch paper. I'll have a stapler to staple your exam back together. Grades will be available in WebCT as soon as possible.

Cover your work and your Parscore. Don't talk or look around the room like an idiot. If something is illegible then please notify me. If a question is ambiguous then please ask me to clarify.

DON'T GIVE UP! Do your best on every problem. You are not supposed to already know the answer, you are to figure it out using what you know. Use all of your available time. If you finish early, redo the problems to verify correctness. Don't "check your work"; redo it separately without looking at your previous work.

For problems 1-10 select the letter that has the correct answer.

Example: $\sin(\pi/6) =$ The correct answer would be A since $\sin(\pi/6) = 1/2$

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- A) $\pm 1/2$ B) ± 1 C) $\pm \sqrt{3}/2$ D) $\frac{\sqrt{6} \pm \sqrt{2}}{4}$ E) None of the above
-

1) $\cos(\pi/12) [\sin^2(\pi/4) + \cos^2(\pi/4)] =$

2) $\cos(3\pi/4) \sin(3\pi/4) [\tan(3\pi/4) + \cot(3\pi/4)] =$

3) $\cot(11\pi/12) \sin(11\pi/12) =$

4) $\frac{\cos(7\pi/6)}{\cot(7\pi/6)} =$

5) $\sec(\pi/2 - \pi/9) \sin(\pi/9) =$

6) $[\cos^2(\pi/24) - \sin^2(\pi/24)] [\cos^2(\pi/24) + \sin^2(\pi/24)] =$

7) $2\sin(30^\circ) \cos(15^\circ) - \sin(15^\circ) =$

8) $\sin(\cos^{-1}(1/2)) =$

9) $\sin(\cos^{-1}(\sin(\pi/3))) =$

10) $\cot(\cos^{-1}[\sin(\tan^{-1}(1))]) =$

11) Which of the following are completely true?

A) $\cos(8x) = \cos^2(4x) - \sin^2(4x)$

B) $\cos(4x) = 1 - 2\sin^2(2x)$

C) $1 = 2\cos^2(3x) - \cos(6x)$

D) All of the above

E) None of the above

12) Which of the following are completely true if $x+y+z = \pi$?

A) $\sin(x+y+z) = \sin(x+y)\cos z + \cos[-(x+y)]\sin z$

B) $\cos(x+y-z) = \cos x \cos y \cos z - \sin x \sin y \sin z + \sin x \cos y \sin z + \cos x \sin y \sin z$

C) $\sin x \cos(y+z) + \cos x \sin(y+z) = 0$

D) All of the above

E) None of the above

13) If $\omega = \frac{1}{2} + \frac{\sqrt{3}}{2}i$ which of the following are completely true?

A) $\omega^2 = \bar{\omega}$

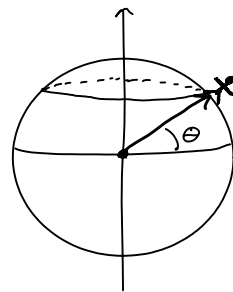
B) $\bar{\omega}^2 = \omega$

C) $\omega \bar{\omega} = 1$

D) All of the above

E) None of the above

14) R_E is the Earth's radius. It takes 24 hours for the Earth to complete a single rotation about its axis. If you are standing on the surface of the spinning Earth at a latitude θ , what is your angular velocity, ω , and your linear velocity v ?



A) $v = \frac{\pi R_E}{12 \text{ hours}}$, $\omega = \frac{\pi R_E}{12 \text{ hours}}$ B) $v = \frac{\pi R_E \cos \theta}{12 \text{ hours}}$, $\omega = \frac{\pi}{12 \text{ hours}}$

C) $v = \frac{\pi R_E}{12 \text{ hours}}$, $\omega = \frac{\pi}{12 \text{ hours}}$ D) $v = \frac{\pi R_E \sin \theta}{12 \text{ hours}}$, $\omega = \frac{\pi}{12 \text{ hours}}$

E) None of the above

15) Which of the following are completely true?

A) $\cos(1^\circ) - \cos(2^\circ) + \cos(3^\circ) - \cos(4^\circ) + \dots + \cos(359^\circ)$
 $= -\sin(1^\circ) + \sin(2^\circ) - \sin(3^\circ) + \sin(4^\circ) + \dots - \sin(359^\circ)$

B) $\cos^2(1^\circ) + \cos^2(2^\circ) + \dots + \cos^2(359^\circ) = 1$

C) $\tan(1^\circ) + \tan(2^\circ) + \dots + \tan(89^\circ) + \tan(91^\circ) + \dots + \tan(179^\circ) = \tan(181^\circ) + \dots + \tan(269^\circ) + \tan(271^\circ) + \dots + \tan(359^\circ)$

D) All of the above

E) None of the above

16) $\sqrt{3}^i (1+i)^8 (-1 + \sqrt{3}i)^3 (-1 - \sqrt{3}i)^6 (-1+i)^4 =$

A) $2^{17} 3^{1/2}$ B) $-2^{17} 3^{1/2}$ C) $2^{17} 3^{1/2} i$ D) $-2^{17} 3^{1/2} i$ E) None of the above

17) $\frac{(-1 + \sqrt{3}i)^3}{(-1 - \sqrt{3}i)^6} \cdot \frac{(1 - \sqrt{3}i)^6}{(1 + \sqrt{3}i)^3} =$

A) $2^{17} 3^{1/2}$ B) -2^{11} C) $2^9 (1 + \sqrt{3}i)$ D) -1 E) None of the above

18) Solve for z : $z^4 + 8 - 8\sqrt{3}i = 0$

- A) $\pm 1 \pm 3i, \pm \sqrt{3} \pm i$ B) $\pm 1 \mp 3i, \pm \sqrt{3} \mp i$
C) $\pm 1 \pm 3i, \pm \sqrt{3} \mp i$ D) $\pm 1 \mp 3i, \pm \sqrt{3} \pm i$
E) None of the above
-

19) Which of the following is completely true?

- A) The equation $a_4 z^4 + a_3 z^3 + a_2 z^2 + a_1 z + a_0 = 0$ where $a_0, a_1, \dots, a_4 \in \mathbb{R}$ has 4 solutions that will be real numbers.
B) The equation $a_4 z^4 + a_3 z^3 + a_2 z^2 + a_1 z + a_0 = 0$ where $a_0, a_4 \in \mathbb{R}$ and $a_3 = a_2 = a_1 = 0$ has 4 solutions that will be real or will come in complex conjugate pairs, they will all have the same radius, and they will be separated by an angle of 90° .
C) The equation $a_4 z^4 + a_3 z^3 + a_2 z^2 + a_1 z + a_0 = 0$ where $a_0, a_4 \in \mathbb{C}$ and $a_3 = a_2 = a_1 = 0$ has 4 solutions that may not come in complex conjugate pairs and they won't all have the same radius either.
D) All of the above
E) None of the above
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20) The solutions to the equation $z^3 + 3 - 4i = 0$ are the vertices (corners) of an equilateral triangle in the complex plane. Find the area of this triangle.

- A) 5 B) $5\frac{\sqrt{3}}{2}$ C) $\frac{5}{2}$ D) $\frac{5\pi}{2}$ E) None of the above
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21) The graph of $f(x) = 2 \sin(3x - \pi) - 4$ looks like the graph of $\sin(x)$ except that the graph of $f(x)$

- A) has a period 3 times larger than that of $\sin(x)$
 - B) has a phase shift of 3π
 - C) is shifted to the right by 4
 - D) All of the above
 - E) None of the above
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22) The graph of $f(x) = 2 \sin(\pi x - 3) - 4$ looks like the graph of $\sin(x)$ except that the graph of $f(x)$

- A) has π times more periods than $\sin(x)$
 - B) has half the amplitude of $\sin(x)$
 - C) has a phase shift of $-\pi/3$
 - D) All of the above
 - E) None of the above
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23) The graph of $f(x) = 2 \sin(\pi x - 3\pi) - 4$ looks like the graph of $\sin(\pi x)$ except that the graph of $f(x)$

- A) has π times more periods than $\sin(\pi x)$
 - B) has twice the amplitude of $\sin(x)$
 - C) has a phase shift of 3
 - D) All of the above
 - E) None of the above
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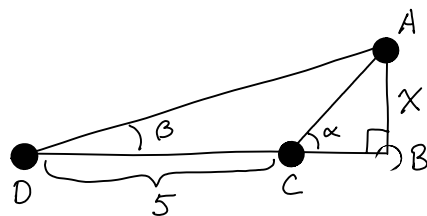
24) Which of the following is completely true?

- A) The graph of $\sec x$ can be made by flipping the graph of $\csc x$ about the vertical line $x = \pi/4$
 - B) The graph of $\cot x$ can be made by flipping the graph of $\tan x$ about the vertical line $x = \pi/4$
 - C) The graph of $\cos x$ can be made by flipping the graph of $\sin x$ about the vertical line $x = \pi/4$
 - D) All of the above
 - E) None of the above
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25) Which of the following is completely true?

- A) There is only 1 triangle that fits the following data: $\alpha = \tan^{-1}(3/4)$, $a = 3$, $b = 4$
 - B) There is only 1 triangle that fits the following data: $\alpha = \sin^{-1}(3/5)$, $a = 3$, $b = 4$
 - C) There is only 1 triangle that fits the following data: $\beta = \sin^{-1}(4/5)$, $a = 3$, $b = 4$
 - D) All of the above
 - E) None of the above
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26) If $\alpha = 50^\circ$ and $\beta = 20^\circ$, find x



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- A) $\frac{5 \tan(50^\circ) \tan(20^\circ)}{\tan(50^\circ) + \tan(20^\circ)}$
 - B) $\frac{5 \tan(50^\circ) \tan(20^\circ)}{\tan(20^\circ) - \tan(50^\circ)}$
 - C) $\frac{5 \tan(50^\circ) \tan(20^\circ)}{\tan(50^\circ) - \tan(20^\circ)}$
 - D) $5[\tan(70^\circ) - \tan(50^\circ) + \tan(20^\circ)]$
 - E) None of the above
-

27) Which of the following is completely true?

A) If $a=1$, $\beta=30^\circ$, and $\gamma=50^\circ$ are given then $b = \frac{\sin(30^\circ)}{\sin(100^\circ)}$

B) If $a=1$, $b=2$, and $\gamma=50^\circ$ are given then $c = \sqrt{5 - 4\cos(50^\circ)}$

C) If $a=1$, $b=2$, and $\gamma=50^\circ$ are given then $\beta = \sin^{-1}\left[\frac{2\sin(50^\circ)}{\sqrt{5 - 4\cos(50^\circ)}}\right]$

D) All of the above

E) None of the above

EXTRA CREDIT PROBLEMS 28-30

28) $r[\cos\theta \pm i\sin\theta] = r e^{\pm i\theta}$ in complex exponential notation. What is $\tan\theta$?

A) $\frac{e^{i\theta} + e^{-i\theta}}{2}$

B) $\frac{e^{i\theta} + e^{-i\theta}}{2i}$

C) $\frac{e^{i\theta} - e^{-i\theta}}{2}$

D) $\frac{e^{i\theta} - e^{-i\theta}}{2i}$

E) None of the above

29) $\log_{10}(x^2 \sqrt{x^3+1}) =$

A) $2\log_{10}(x) + \frac{\log_{10}(x^3+1)}{2}$

B) $2(1/2)(3)[\log_{10}(x) + \log_{10}(\sqrt{x^3+1})]$

C) $\log_{10}(x^2) \cdot \log_{10}(\sqrt{x^3+1})$

D) All of the above

E) None of the above

30) Solve for x : $2^{x+1} \cdot 16^{-x} = 1/2$

A) $x=3/2$ B) $x=2/3$ C) $x=0$ D) $x=\log_2$ E) None of the above