RED DO NOT WRITE ON THE EXAM

Math 111 - Section 1 (J. Tay)
Final Jun 13 - Jun 14, 2012

1. In the given right triangle (Fig. 1) $a = 6$ and $B = 65°$. Find the hypotenuse c.

   A. $\dfrac{6}{\sin 25°}$ B. $6 \sin 25°$ C. $\dfrac{6}{\cos 25°}$

   D. $6 \cos 25°$ E. $6 \cot 25°$

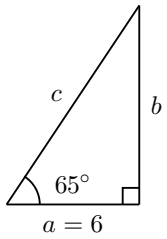


Fig. 1 (Drawing not to scale)

2. Which of the following is an identity?

   A. $\sin\theta = \cos(\theta - \pi)$

   B. $\sin\theta = \cos(-\theta)$

   C. $\sin\theta = \cos(2\theta - \pi)$

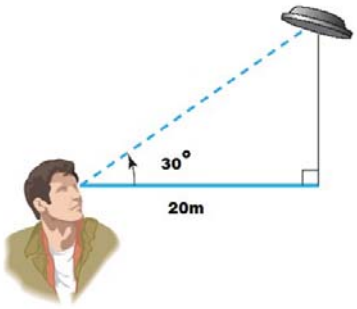
   D. $\sin\theta = \cos(\pi - \theta)$

   E. $\sin\theta = \cos\left(\dfrac{\pi}{2} - \theta\right)$

3. Conway is looking at an object at a 30° angle. If the object is hovering over a point 20m away from Conway, how high is that object?

   A. $\dfrac{20}{\sqrt{3}}$m B. $20\sqrt{3}$m C. $\dfrac{20}{\sqrt{2}}$m

   D. $20\sqrt{2}$m E. 10m



4. It is given that $\sin^{-1}\left(\dfrac{6\sin 22°}{4}\right) \approx 32.2°$. A triangle has a side of length 4 with an opposite angle of 22°. The length of another side of the triangle is 6. How many solutions are there for such a triangle?

   A. Not enough information to determine

   B. 3

   C. 2

   D. 1

   E. 0

5. A triangle has a side of length 2 with an opposite angle of 70°. The length of another side of the triangle is 8. How many solutions are there for such a triangle?

   A. Not enough information to determine

   B. 3

   C. 2

   D. 1

   E. 0

6. Given the following triangle (Fig. 6), find the measure of the missing side length a.

   A. $\dfrac{10\sin 18^\circ}{\sin 142^\circ}$ B. $\dfrac{10\sin 18^\circ}{\sin 20^\circ}$ C. $\dfrac{10\sin 20^\circ}{\sin 142^\circ}$

   D. $\dfrac{10\sin 142^\circ}{\sin 20^\circ}$ E. $\dfrac{10\sin 142^\circ}{\sin 18^\circ}$

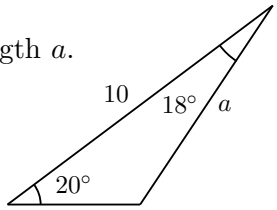


Fig. 6 (Drawing not to scale)

7. Given the following triangle (Fig. 7), find the measure of the missing side length c.

   A. $\sqrt{16+64\sqrt{2}}$ B. $\sqrt{64-32\sqrt{2}}$ C. $\sqrt{80-32\sqrt{2}}$

   D. $\sqrt{48+64\sqrt{2}}$ E. $\sqrt{64+32\sqrt{2}}$

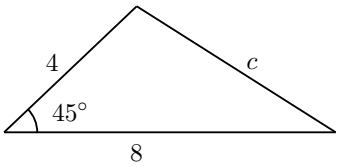
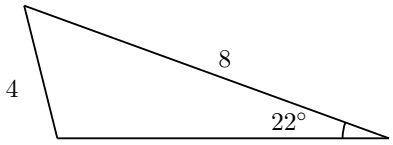


Fig. 7 (Drawing not to scale)

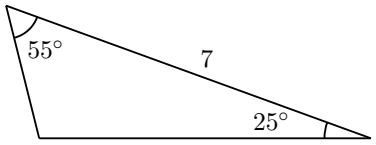
8. A triangle has sides with lengths 3,4 and 6. Find $\cos A$ where A is the angle opposite the side with length 6.

   A. $-\dfrac{11}{24}$ B. $\dfrac{29}{36}$ C. -1 D. $\dfrac{45}{48}$ E. $-\dfrac{11}{12}$

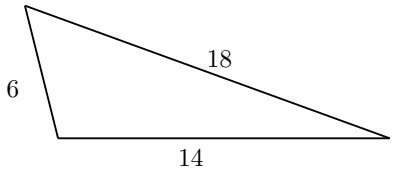
9. Which of the following triangles (not drawn to scale) is **NOT** matched with a correct method of solving?



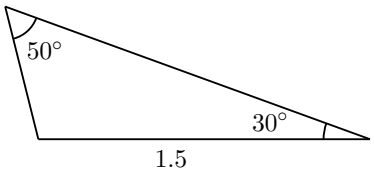
Triangle I



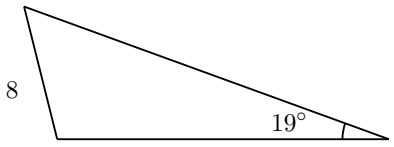
Triangle II



Triangle III



Triangle IV



Triangle V

   A. I: Law of Sines
   B. II: Law of Cosines
   C. III: Law of Cosines
   D. IV: Law of Sines
   E. V: Cannot be solved

10. Find the area of the triangle in Question 7.

A. 16 B. $2\sqrt{2}$ C. $4\sqrt{2}$ D. $8\sqrt{2}$ E. $16\sqrt{2}$

11. Find the area of a triangle with sides 4, 6 and 8 using Heron's Formula.

A. $\sqrt{15}$ B. $\sqrt{135}$ C. $\sqrt{270}$ D. $\sqrt{1728}$ E. $\sqrt{3456}$

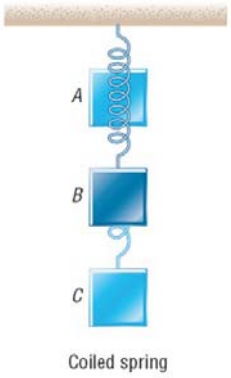
12. The angles of a triangle A, B, C are known. Length a which is opposite to angle A is also known. What is the area of the triangle?

A. $\dfrac{a^2 \sin B \sin C}{\sin A}$ B. $\dfrac{a^2 \sin A \sin B}{\sin C}$ C. $\dfrac{a^2 \sin A \sin C}{\sin B}$ D. $\dfrac{a^2 \sin A \sin C}{2 \sin B}$ E. $\dfrac{a^2 \sin B \sin C}{2 \sin A}$

13. The equation that describes the simple harmonic motion of the coiled spring is $d = a\cos(\omega t)$. It takes $\pi/4$ seconds to move from Position C to Position B (without passing Position B). What is ω?

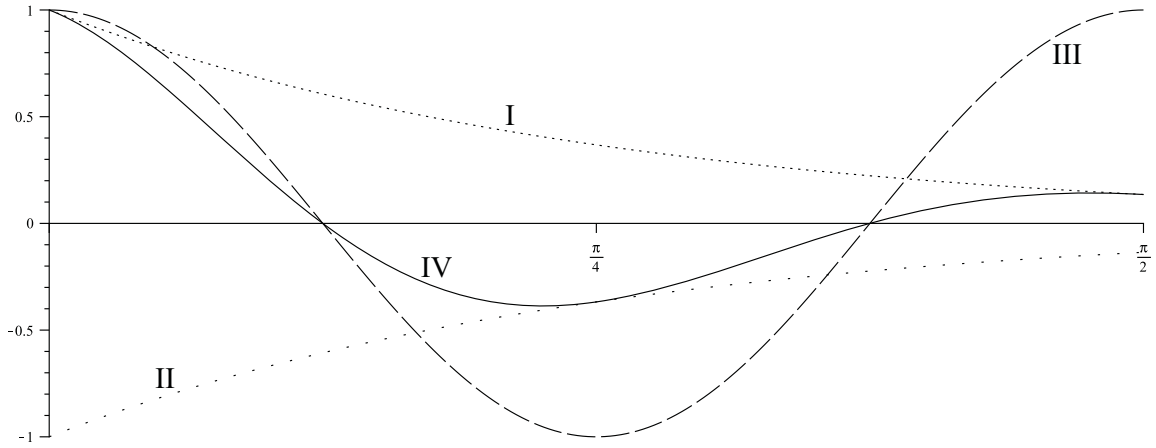
A. 8 B. 4 C. 2

D. 1 E. $\dfrac{1}{2}$



Coiled spring

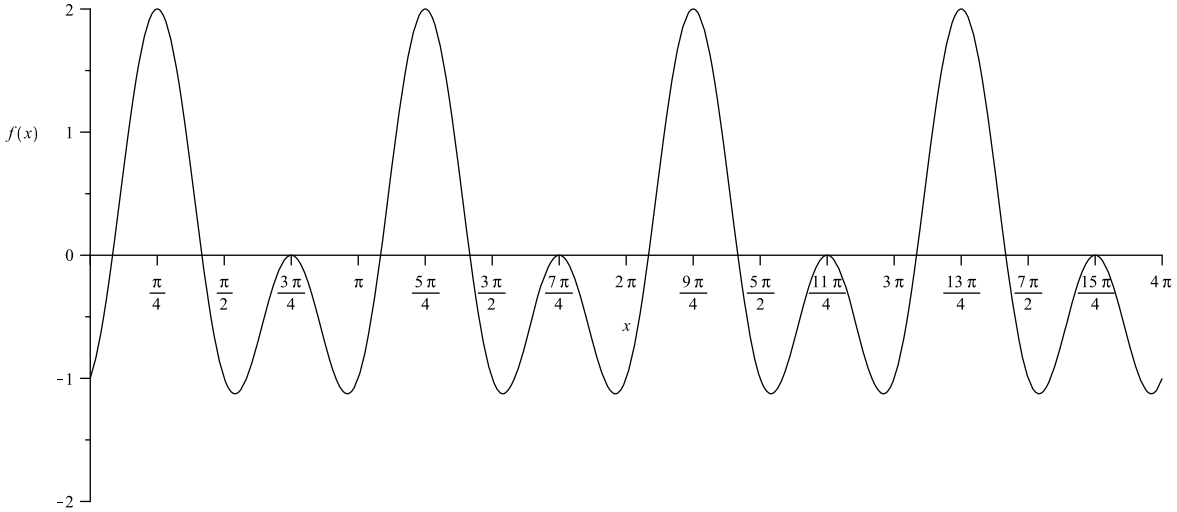
14. A damped vibration curve has the equation $d(t) = e^{-4t/\pi}\cos(4t)$.



Match the graphs to the equations

A.	I: $e^{-4t/\pi}$	II: $-e^{-4t/\pi}$	III: $e^{-4t/\pi}\cos(4t)$	IV: $\cos(4t)$
B.	I: $e^{-4t/\pi}$	II: $-e^{-4t/\pi}$	III: $\cos(4t)$	IV: $e^{-4t/\pi}\cos(4t)$
C.	I: $e^{-4t/\pi}\cos(4t)$	II: $e^{-4t/\pi}$	III: $\cos(4t)$	IV: $-e^{-4t/\pi}$
D.	I: $e^{-4t/\pi}$	II: $e^{-4t/\pi}\cos(4t)$	III: $\cos(4t)$	IV: $-e^{-4t/\pi}$
E.	I: $e^{-4t/\pi}\cos(4t)$	II: $-e^{-4t/\pi}$	III: $e^{-4t/\pi}$	IV: $\cos(4t)$

15. Identify the graph below.



A. $f(x) = \sin(2x) - \cos(4x)$
B. $f(x) = \sin(2x) + \cos(4x)$
C. $f(x) = -\sin(2x) - \cos(4x)$
D. $f(x) = -\sin(x) - \cos(4x)$
E. $f(x) = \sin(x) + \cos(4x)$

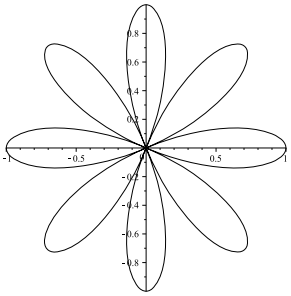
16. Which of the following is a polar coordinate representation of a point whose rectangular coordinates are $(\sqrt{3}, -1)$?

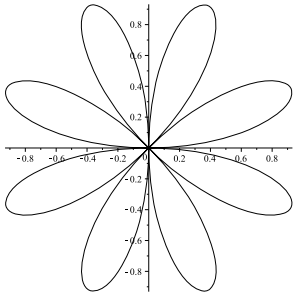
A. $\left(-2, -\frac{\pi}{6}\right)$ B. $\left(-2, \frac{5\pi}{6}\right)$ C. $\left(2, \frac{\pi}{6}\right)$ D. $\left(2, \frac{\pi}{3}\right)$ E. $\left(2, -\frac{\pi}{3}\right)$

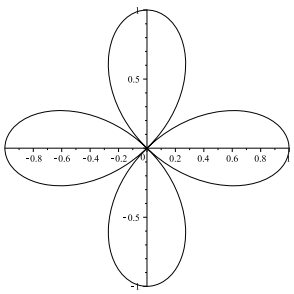
17. Transform the equation $2xy = 1$ from rectangular coordinates to polar form.

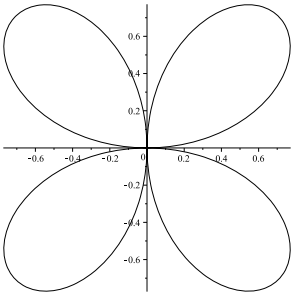
A. $r \sin\theta = 0.5$
B. $2r\cos^2\theta = 1$
C. $2r\sin^2\theta = 1$
D. $2r\theta = 1$
E. $r^2\sin(2\theta) = 1$

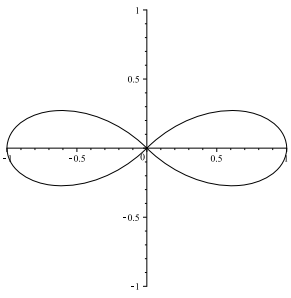
18. Identify the graph of the following polar equation: $r = \cos(4\theta)$.

A.


B.


C.


D.


E.


19. If $z = 2(\cos 50^\circ + i \sin 50^\circ)$ and $w = \cos 10^\circ + i \sin 10^\circ$, what is $\dfrac{z}{w}$?

A. $2(\cos 40^\circ + i \sin 40^\circ)$
B. $2(\cos 5^\circ + i \sin 5^\circ)$
C. $2(\cos 60^\circ + i \sin 60^\circ)$
D. $\cos 40^\circ + i \sin 40^\circ$
E. $\cos 5^\circ + i \sin 5^\circ$

20. Which of the following is not a fourth root of i?

A. $\cos \dfrac{5\pi}{8} + i \sin \dfrac{5\pi}{8}$
B. $\cos \dfrac{7\pi}{8} + i \sin \dfrac{7\pi}{8}$
C. $\cos \dfrac{\pi}{8} + i \sin \dfrac{\pi}{8}$
D. $\cos \dfrac{9\pi}{8} + i \sin \dfrac{9\pi}{8}$
E. $\cos \dfrac{13\pi}{8} + i \sin \dfrac{13\pi}{8}$

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