MATH 111 - Final - Summer 2011 - Section 1

No books, notes, or calculators allowed.
There is no time limit.

1. In a right triangle, $A = 53°$ and $b = 6$. Find the length of the hypotenuse c.

   (a) $\frac{6}{\sin(53°)}$
   (b) $6\sin(53°)$
   (c) $\frac{6}{\cos(53°)}$
   (d) $6\cos(53°)$
   (e) $\frac{6}{\tan(53°)}$
   (f) $6\tan(53°)$

2. A 20 foot extension ladder leaning against a building makes a 68° angle with the ground. Find how far up the building the ladder reaches.

   (a) $\frac{\sin(68°)}{20}$
   (b) $20\sin(68°)$
   (c) $\frac{\cos(68°)}{20}$
   (d) $20\cos(68°)$
   (e) $\frac{\tan(68°)}{20}$
   (f) $20\tan(68°)$

3. Use the Complementary Angle Theorem to find $\tan(25°)\cot(65°) - \sec(25°)\csc(65°)$

   (a) -1 (b) 1 (c) 0 (d) 2 (e) -2 (f) $\frac{1}{2}$

4. A triangle has angles $A = 45°$ and $B = 105°$ with side $b = 2$. Find the length of side c.

   (a) $\sqrt{6}$ (b) $\sqrt{2}$ (c) $\sqrt{6}+\sqrt{2}$ (d) $\sqrt{6}-\sqrt{2}$ (e) 1 (f) $2\sqrt{2}$

5. Determine how many triangles can be produced with the given information: $a = 3$, $c = 1$ and $C = 30°$.

   (a) 0
   (b) 1
   (c) 2
   (d) Not enough information is given.

6. A triangle has sides $a = 4$, $b = 5$ and $c = 6$. Find the angle C.

   (a) $\cos^{-1}(\frac{1}{4})$ (b) $\cos^{-1}(-\frac{1}{4})$ (c) $\sin^{-1}(\frac{1}{4})$ (d) $\cos^{-1}(-\frac{1}{8})$ (e) $\sin^{-1}(-\frac{1}{4})$ (f) $\cos^{-1}(\frac{1}{8})$

7. Find the third side of a triangle that has sides $a = 3$ and $b = 4$ and angle $C = 60°$.

   (a) 5 (b) 6 (c) $\sqrt{5}$ (d) $\sqrt{7}$ (e) $\sqrt{11}$ (f) $\sqrt{13}$

8. Find the area of the triangle from the previous problem.

   (a) 6 (b) $3\sqrt{2}$ (c) $3\sqrt{3}$ (d) $6\sqrt{2}$ (e) $6\sqrt{3}$ (f) 5

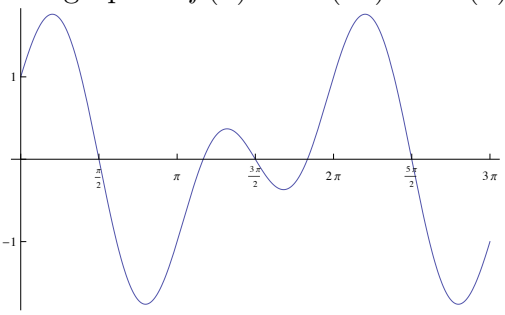
9. Use Heron's Formulas to find the area of a triangle that has side lengths 5, 6 and 7.

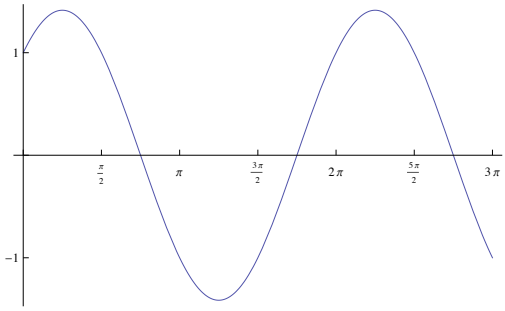
   (a) $\sqrt{3}$
   (b) $3\sqrt{3}$
   (c) $2\sqrt{2}$
   (d) $\sqrt{2}$
   (e) $6\sqrt{6}$
   (f) $\sqrt{6}$

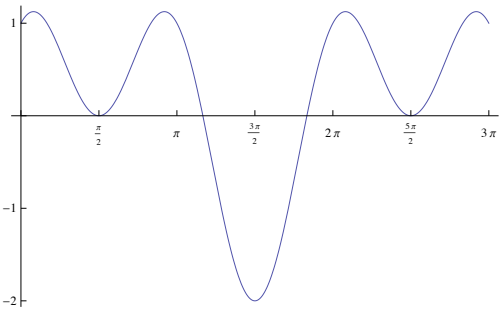
10. An object attached to a coiled spring is pulled down 5 centimeters from its position of rest and is released. Assuming it has simple harmonic motion with period 2, find the equation that describes the position of the object after t seconds.

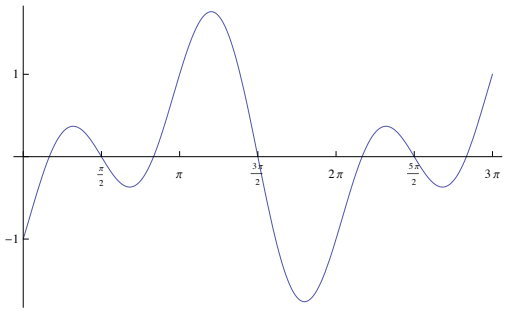
(a) $d(t) = 5cos(\pi t)$
(b) $d(t) = -5cos(\pi t)$
(c) $d(t) = 5cos(\frac{t}{\pi})$
(d) $d(t) = -5cos(\frac{t}{\pi})$
(e) $d(t) = 5cos(\frac{t}{2})$
(f) $d(t) = 5cos(2t)$

11. Find the graph of $f(x) = \sin(2x) + \cos(x)$.

(a) 

(b) 

(c) 

(d) 

12. Let $(2, -\frac{\pi}{6})$ be a point in polar coordinates. Which of the following is NOT the same point?

(a) $(2, \frac{11\pi}{6})$ (b) $(2, -\frac{13\pi}{6})$ (c) $(-2, \frac{\pi}{6})$ (d) $(-2, \frac{5\pi}{6})$ (e) $(-2, -\frac{7\pi}{6})$ (f) $(2, -30°)$

13. Find the polar coordinates of the point $(-2, 2\sqrt{3})$ which is in rectangular coordinates.

(a) $(2, \frac{\pi}{3})$ (b) $(2, \frac{2\pi}{3})$ (c) $(2, \frac{5\pi}{6})$ (d) $(4, \frac{\pi}{3})$ (e) $(4, \frac{2\pi}{3})$ (f) $(4, \frac{5\pi}{6})$

14. Convert the point in polar coordinates $(-2, \frac{3\pi}{4})$ to rectangular coordinates.

(a) $(\sqrt{2}, \sqrt{2})$
(b) $(-\sqrt{2}, \sqrt{2})$
(c) $(\sqrt{2}, -\sqrt{2})$
(d) $(-\sqrt{2}, -\sqrt{2})$
(e) $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
(f) $(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

15. Transform the equation $r = -4\sin(\theta)$ from polar coordinates to rectangular coordinates.

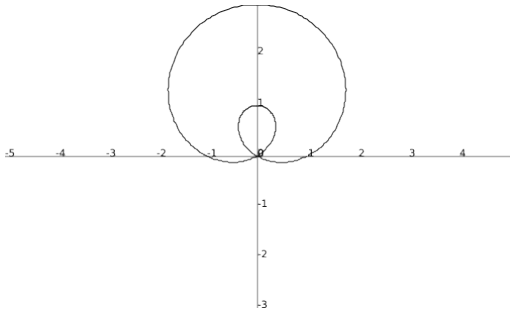
(a) $(x+2)^2 + y^2 = 4$
(b) $(x+2)^2 + y^2 = 2$
(c) $(x-2)^2 + y^2 = 4$
(d) $(x-2)^2 + y^2 = 8$
(e) $x^2 + (y-2)^2 = 4$
(f) $x^2 + (y+2)^2 = 4$

16. Transform the equation $r\cos(\theta) = -3$ from polar coordinates to rectangular coordinates.

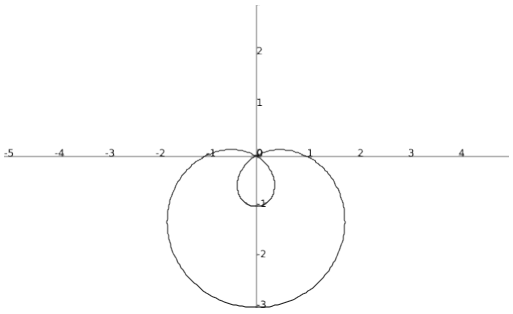
(a) $x = 3$ (b) $x = -3$ (c) $y = 3$ (d) $y = -3$ (e) $y = 3x$ (f) $y = -3x$

17. Identify the graph of the following polar equation: $r = 1 - 2\sin\theta$.

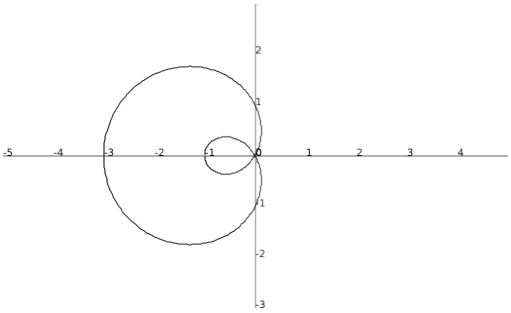
(a)



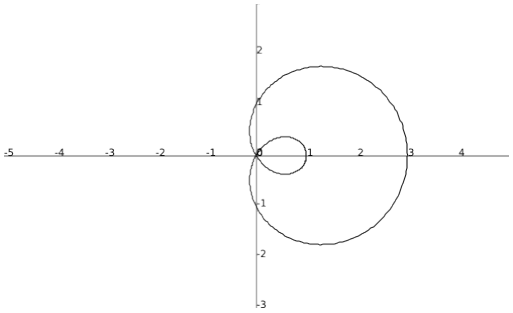
(b)



(c)

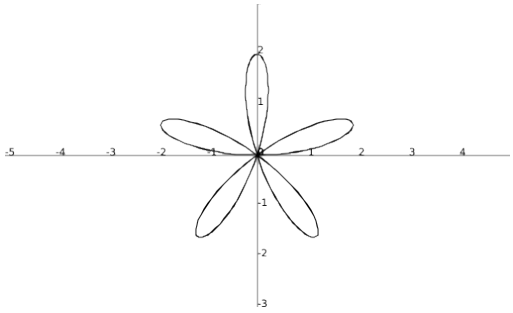


(d)

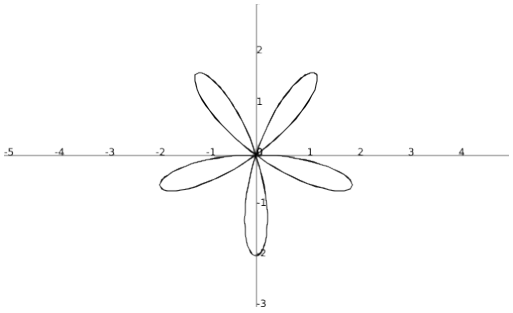


18. Identify the graph of the following polar equation: $r = -2\cos(5\theta)$.

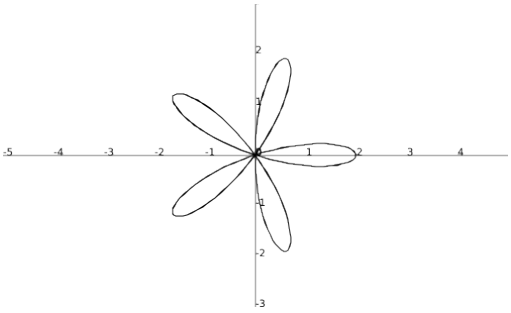
(a)



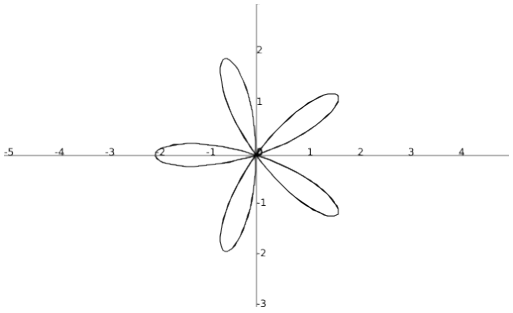
(b)



(c)



(d)

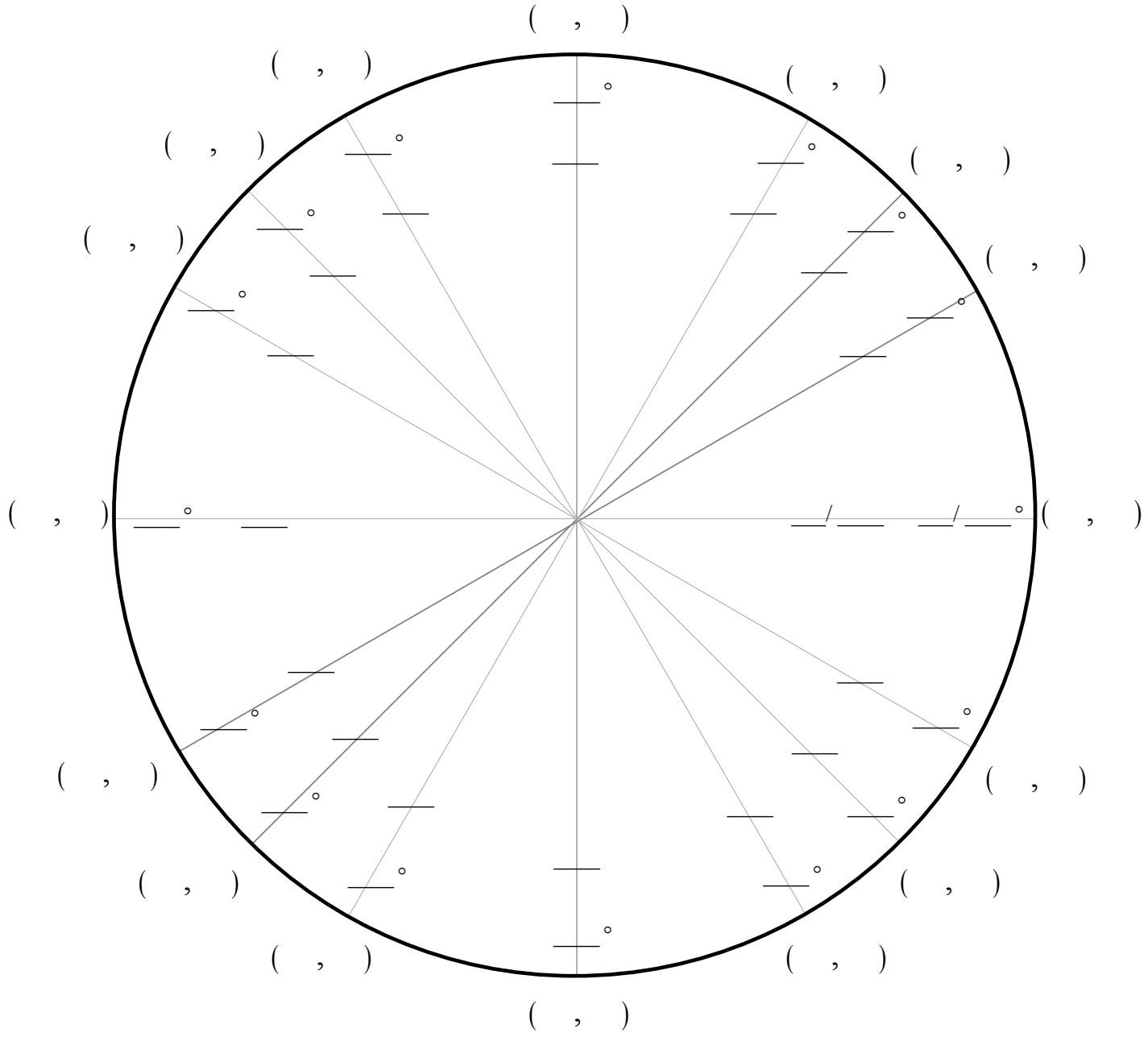


19. If $z = 4(\cos(25°) + i\sin(25°))$ and $w = 2(\cos(65°) + i\sin(65°))$, find $z * w$.

(a) 8 (b) $8i$ (c) -8 (d) $-8i$ (e) 2 (f) $2i$

20. Find $(\frac{\sqrt{2}}{2} + i\frac{\sqrt{2}}{2})^{20}$

(a) 1 (b) i (c) -1 (d) $-i$ (e) $1 - i$ (f) $-1 - i$



1. c
2. b
3. a
4. d
5. a
6. f
7. f
8. c
9. e
10. b
11. a
12. c
13. e
14. c
15. f
16. b
17. b
18. d
19. b
20. c