

Math 1155, Fall 2009, Exam III

Name:

Section:

Instructions: This is the third exam for Math 1155, Intensive Precalculus. You have 50 minutes to complete the test. Do not start until you are told to begin.

When you receive this booklet, count the pages to be sure that you have every page. There should be 9 pages, including this cover sheet. No notes or books are allowed on this exam. Scientific calculators are allowed, however, calculators with graphing capabilities may not be used. You should simplify all fractions and square roots when they appear in your answer. For decimal answers, round angles to at least 1 decimal place and other numbers to 3 significant figures.

I expect you to use notation correctly and may penalize you for failing to do so. In particular, an equal sign should appear between two things that are equal; an equal sign should not appear between two things that are not equal. For full credit on a problem you must show the final correct answer and give a reasonably neat and logical account of how you got that answer.

There are a total of 50 points, distributed among 10 problems. The problems are worth varying amounts. You must show your work for all problems. Little or no credit will be given for unsupported answers. Even if you can do the problems in your head, you must convince me that you know what you're doing. Good luck.

Problem	Points	Possible
1-5		20
6		6
7		6
8		6
9		6
10		6
Total		50

This is the multiple choice portion of the exam. Circle all answers that are correct. There will only be one correct answer to a question. No partial credit on these.

1. (4 points) Find $(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i)^2$.

- (a) $-i$
- (b) $-1 - i$
- (c) i
- (d) $1 + i$
- (e) None of these

2. (4 points) Find $\arcsin(\sin \frac{4\pi}{3})$.

- (a) $\frac{\pi}{3}$
- (b) $\frac{2\pi}{3}$
- (c) $\frac{-\pi}{3}$
- (d) $\frac{4\pi}{3}$
- (e) None of these

3. (4 points) Find $\arccos(\cos \frac{4\pi}{3})$.

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

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

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

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

(e) None of these

4. (4 points) Where is the vertex of the function $f(x) = 2x^2 - 16x + 3$?

(a) (4,-13)

(b) (4,-29)

(c) (0,3)

(d) (2,-21)

(e) None of these

5. (4 points) Solve the equation $4 \arcsin(2x) = \pi$.

(a) $x = 0$

(b) $x = \frac{\sqrt{2}}{4}$

(c) $x = \frac{1}{4}$

(d) $x = \frac{\sqrt{3}}{4}$

(e) None of these

6. (6 points) It is well known that there is a linear relationship between degrees Fahrenheit and degrees Celsius. Let $x = {}^\circ C$ and $y = {}^\circ F$.

a) Given $0{}^\circ C = 32{}^\circ F$ and $100{}^\circ C = 212{}^\circ F$, find the equation to convert ${}^\circ C$ to ${}^\circ F$.

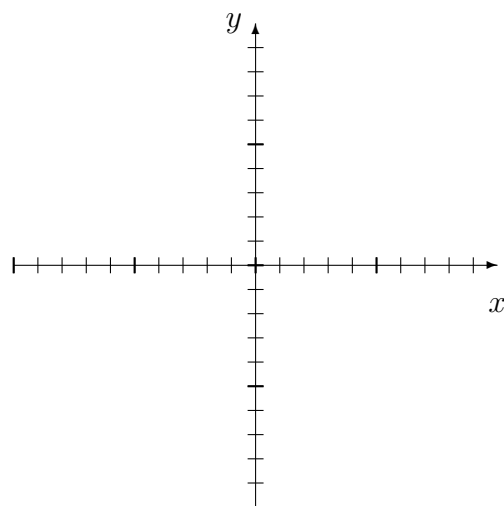
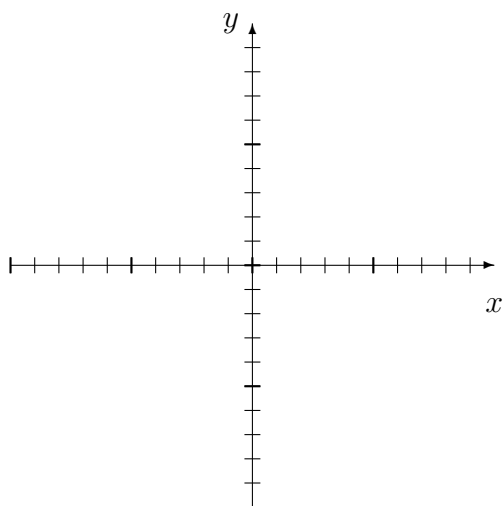
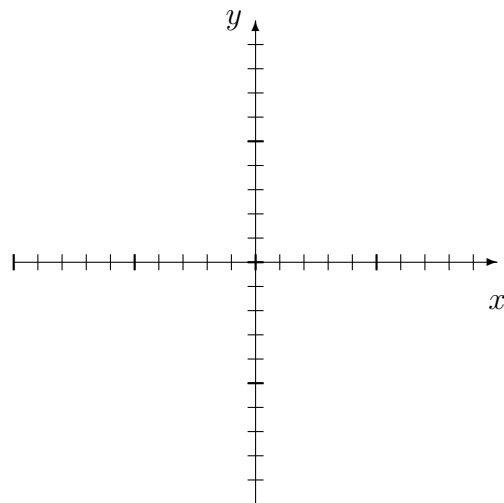
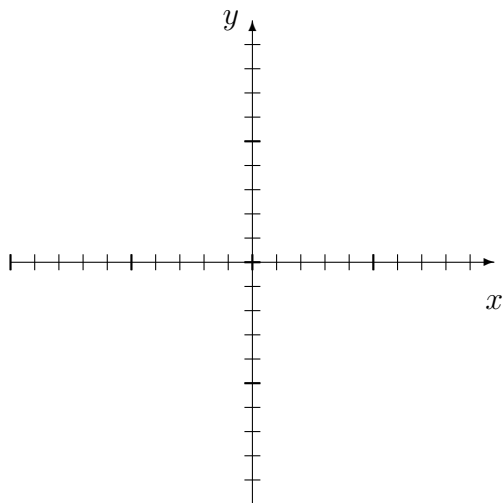
b) Find the number z for which $z{}^\circ C = z{}^\circ F$.

7. (6 points) A parabolic arch is 90 feet high at the center and 80 feet high 10 feet from the center in either direction.

a) Find the equation of the arch (Hint: Let $x = 0$ at the center of the arch, and let $y = 0$ represent the ground).

b) How wide is the arch?

8. (6 points) Graph $f(x) = 3 \cos(\frac{2x}{3}) + 2$. Find the amplitude and period of this function. If you use multiple graphs, be sure to label each graph. You will also be required to clearly identify the usual 5 points on the final graph.



9. (6 points) A farmer has 100 feet of fence to enclose a rectangle. To increase the maximum area, the farmer will only fence three sides of the rectangle and use his barn as the fourth side. Let x be the length of the side perpendicular to the barn.

a) Find the area enclosed as a function of x .

b) Find the maximum possible area that can be enclosed.

10. (6 points) Let $f(x) = \cos(x + 2) + 1$.

a) Find the inverse function $f^{-1}(x)$.

b) Determine the domains of $f(x)$ and $f^{-1}(x)$ keeping in mind that $f(x)$ needs to be one-to-one.