

Math 120
Exam 2
February 22, 2008

Name: _____

1. Your exam contains 6 questions and 5 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values for problems vary and these are clearly indicated. You have 50 minutes for this exam.
3. Make sure to **ALWAYS SHOW YOUR WORK**; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification.
4. If you need extra space, use the back page of the exam and clearly indicate this.
5. You are allowed one 8.5×11 sheet of handwritten notes (both sides). Graphing and scientific calculators are allowed.
6. Leave answers in exact form (as simplified as possible) or round to 4 decimal places.

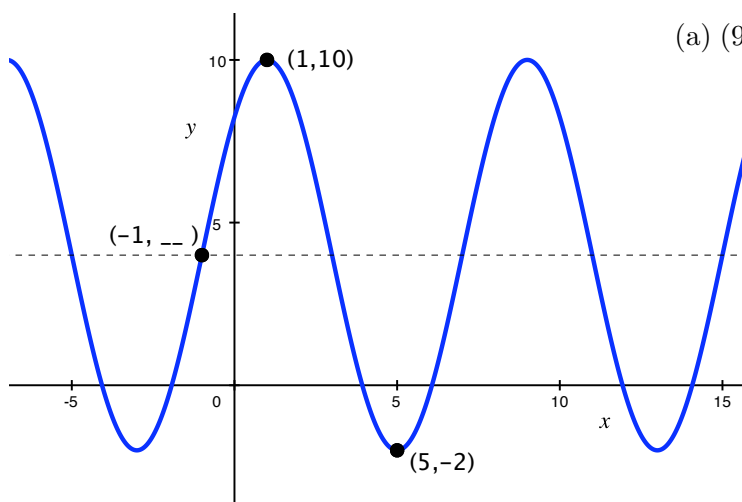
Problem	Total Points	Score
1	14	
2	19	
3	15	
4	16	
5	18	
6	18	
Total	100	

1. (14 pts.) Find the exact values of the following expressions.

(a) (6 pts.) $\cos^{-1}\left(-\frac{1}{2}\right)$

(b) (8 pts.) $\sin^{-1}\left(\sin\left(\frac{10\pi}{3}\right)\right)$

2. (19 pts.) The graph of a sinusoidal function $f(x)$ is given below.



(a) (9 pts.) Find the amplitude, mean, and period.

(b) (10 pts.) Write an equation for $f(x)$.

3. (15 pts.) Prove the following identity: $\cot^2 x - \cos^2 x = \cot^2 x \cdot \cos^2 x$

4. (16 pts.) Find the exact value of $\cos(2\theta)$ given that $\tan \theta = \frac{2}{3}$ for θ in quadrant III.

5. (18 pts.) Find the exact values of the following using **angle addition/subtraction** formulas or **half-angle** formulas.

(a) (9 pts.) $\cos 67.5^\circ$

(b) (9 pts.) $\cos\left(\frac{5\pi}{12}\right)$

6. (18 pts.) Suppose the number of visible sunspots is given by the function

$$s(t) = 50 \cos \frac{2\pi}{11}(t - 3) + 60$$

where t is the number of years after 2000. ($t = 0$ is the year 2000, $t = 1$ is the year 2001, etc.)

(a) (6 pts.) Find the period of $s(t)$.

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#6 Continued

(b) (6 pts.) What are the maximum and minimum number of visible sunspots?

(c) (6 pts.) Find the first year after 2000 for which the number of visible sunspots is maximum.
(Hint: Consider the graph of $s(t)$.)