Math 1151 Midterm I, September 29, 2000, 9:05 - 9:55

Lecturer: Mark de Longueville

Name:

ID number:

Recitation section #:

Recitation instructor:

Room in which you are right now:

Seat # (if there is one):

Signature:

This exam as the final exam is closed book, no tables, crib sheets, or other aids except for a low-end scientific calculator. This is established department policy and practice.
Do one problem after the other. Write all solutions onto this paper, since this is the one going to be graded. You can of course use some scratch paper to make computations. Take your time, do not rush. And do not worry! There will be a time announcement at 9:50.

Smile :)

1	2	3	4	5	6	7	8	9	10
/2	/2	/4	/6	/5	/2	/4	/2	/2	/2

Sum: /31

Grade:

Exercise 1: Convert each angle in degrees into radians. Express your answer as a multiple of π. (1+1 points)

a) $225^\circ =$

b) $-120^\circ =$

Exercise 2: Convert each angle in radians into degrees. (1+1 points)

a) $\frac{\pi}{8} =$

b) $-\frac{10}{3}\pi =$

Exercise 3: Computing the speed of a River Current To approximate the speed of the current of a river, a circular paddle wheel with radius 4 feet is lowered into the water. If the current causes the wheel to rotate at a speed of 10 revolutions per minute, what is the speed of the current? Express your answer first in feet per minute and then in miles per hour. (In case you don't know: 1 mile has 5280 feet.) (3+1 points)

Exercise 4: Find the exact expression for $\sin\frac{\pi}{3}$, $\cos\frac{\pi}{3}$ and $\tan\frac{\pi}{3}$. Prove your answers! (1+1+1+3 points)

Exercise 5: Find the exact value of each of the remaining trigonometric functions. (1+1+1+1+1 points)

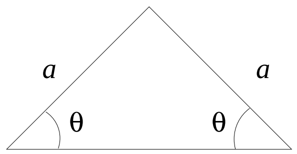
$$\tan\theta = -2, \quad \frac{3}{2}\pi < \theta < 2\pi$$

Exercise 6: What is the domain and the range of the sin and csc functions? (1+1 points)

Exercise 7: Is cos an even or odd function. Write down the formula for the property (even/odd?) that the cos function has and prove it. (1+1+2 points)

Exercise 8: Find a formula that relate the sin and cos function not using the Pythagorean theorem. (Hint: Consider a right triangle and the relation of the two angles that are not the right angle.) (2 points)

Exercise 9: Show that the area of an isosceles triangle is $A = a^2 \sin\theta \cos\theta$, where a is the length of one of the two equal sides and θ is the measure of one of the two equal angles (see the figure). (2 points)



Exercise 10: Graph the function $y = -\cos 3x$ in the coordinate system below. (2 points)