

DEPARTMENT OF MATHEMATICS

BROOKLYN COLLEGE

FINAL EXAMINATION—SPRING 2015

MATHEMATICS 1026 (PRE-CALCULUS B)

Name: _____

**PART I: Answer all 8 questions. Each question is worth 8 points.
Justify each answer and show all your work.**

1. Without the use of a calculator,

(a) convert 18° to radians.

(b) convert $\frac{5\pi}{4}$ radians to degrees.

2. Evaluate and simplify the following expression:

$$\left(\sec \frac{\pi}{4} - \cot \frac{\pi}{3}\right) \cos \frac{\pi}{6}$$

(Do not use your calculator.)

3. A 10-foot ladder leans on a vertical wall. Suppose the bottom of the ladder is $\sqrt{75}$ feet away from the wall. Find the angle which the ladder makes with the ground.

(Do not use your calculator.)

4. Let x be an acute angle and let $\cot x = \frac{1}{\sqrt{3}}$. Find $\sec x$.

(Do not use your calculator.)

5. In triangle ABC with right angle at C , side $a = 4$ and side $c = 4\sqrt{2}$. Find angle B :

(Do not use your calculator.)

6. Verify the following identity: $\frac{1}{1+\sin \theta} - \frac{1}{1-\sin \theta} = -2 \tan \theta \sec \theta$

7. Find the amplitude and period of $y = 5 \sin(2x)$, and graph one complete period.

8. Find the term involving y^4 in the binomial expansion of $(2x + y)^5$.

Please turn over!

PART II: Answer 4 out of 5 questions. Each question is worth 9 points. Justify each answer and show all your work.

9. Let x be in the fourth quadrant and let $\sin x = -\frac{2}{3}$.
Without the use of a calculator,
- (a) Find $\tan x$.
 - (b) Simplify and express $\cos(\arcsin(-\frac{2}{3}))$ in terms of rational numbers or radicals.
10. (a) Find an equation of the ellipse with foci at $(-2, 4)$ and $(-2, -6)$ and eccentricity $\frac{1}{3}$.
- (b) Verify the following identity:
 $\cos 3x = 4 \cos^3 x - 3 \cos x$
11. Find the center, vertices, foci, and asymptotes of the hyperbola
- $$\frac{(y+2)^2}{16} - \frac{(x-1)^2}{4} = 1$$
- and sketch its graph.
12. (a) Solve $\sin 2x = \sin x$ for $0 \leq x < 2\pi$.
- (b) Find $\cos(A - B)$ if A is in the second quadrant with $\sin(A) = \frac{4}{5}$ and B is in the fourth quadrant with $\cos(B) = \frac{12}{13}$.
13. (a) If $\sin \theta = \frac{1}{3}$ and θ is an acute angle, find $\cos 2\theta$.
- (b) With the use of an appropriate formula, evaluate $\frac{\tan 115^\circ - \tan 55^\circ}{1 + \tan 115^\circ \tan 55^\circ}$ without the use of a calculator.

End of Examination