Math 3H Midterm Review Name: _____

Ch. 10-11 Trig Addition Formulas/Polar Coordinates

1. Simplify each expression:

a) $\sin\frac{\pi}{6}\cos\frac{5\pi}{6}+\sin\frac{5\pi}{6}\cos\frac{\pi}{6}$

b) $2\sin\left(\frac{\pi}{4}-\frac{x}{2}\right)\cos\left(\frac{\pi}{4}-\frac{x}{2}\right)$

c) $(1-\cos^2 x)(1-\cot^2 x)$

d) $(\sin x-\cos x)^2-1$

2. Evaluate each of the following if sin A = $\frac{5}{13}$, cos B = $\frac{15}{17}$, and $0 < B < \frac{\pi}{2} < A < \pi$

a) sin (A + B) b) cos (2A – B) c) tan (A – B)

3. Find the acute angle, to the nearest tenth of a degree, formed by the intersection of the graphs of 3x + 4y = 12 and 2x – y = -3

4. Solve each equation for $0 \le x < 2\pi$:

a) $2\sin^2 x = 2 + \cos 2x$

b) $\sin 2x + \sin x = 0$

c) $\cot x \tan 2x = 3$

5. Prove that each equation is an identity:

a) $\sin^2\left(\frac{x}{2}\right) + \cos x = \cos^2\left(\frac{x}{2}\right)$ (hint: make a substitution)

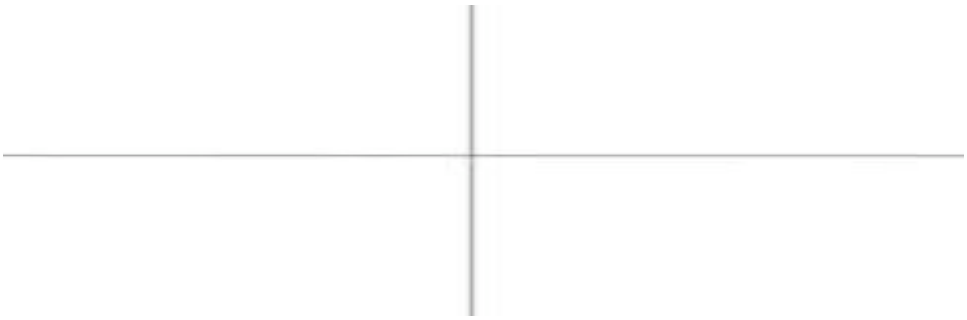
b) $\cos^4 y - \sin^4 y - \cos 2y = 0$

6. Consider functions $f(x) = \sin 2x$ and $g(x) = \cos x$ on the interval $0 \le x \le 2\pi$.

a) Solve $f(x) = g(x)$

b) Solve $f(x) < g(x)$

c) Sketch both graphs on the same set of axes and verify your solutions to (a) and (b).



7. Give polar coordinates (r, θ) where θ is in degrees, for each point:

a) (0, 2)

b) (6, -6)

c) (-4, 3)

8. Give rectangular coordinates (x, y) for each point:

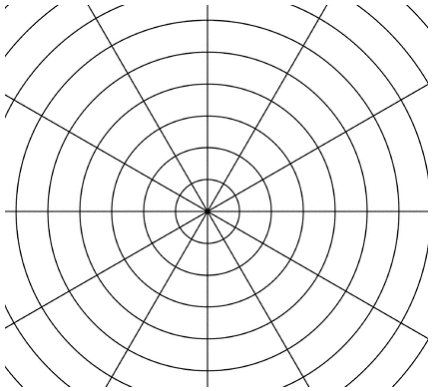
a) $(4, 135^{o})$

b) $\left(8, \frac{7\pi}{6}\right)$

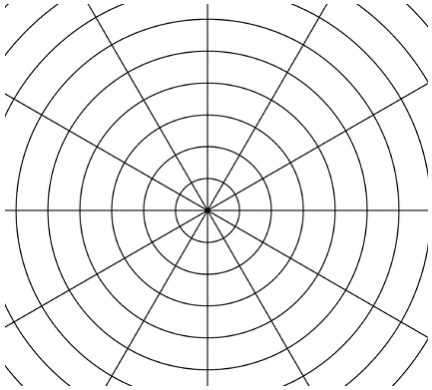
c) $(10, 310^{o})$

9. Sketch the polar graph.

a) $r=1+2\sin\theta$



b) $r=2+\sin\theta$



Let $z_1 = 1+i$, $z_2 = -1 - i\sqrt{3}$, $z_3=3/5 - 4/5i$

10. Express z_1 in polar form

11. Express z_2 in polar form

12. Find z_1z_2 in polar form

13. Express z_3^{10} in rectangular form.

14. Find the three cube roots of z_3.