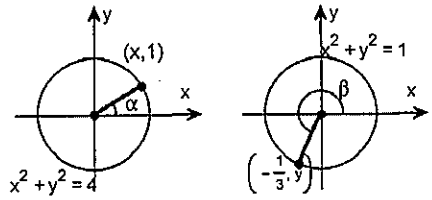
Student: ______________ **Date:** ______________	**Instructor:** Joe Betters **Course:** Pre-Calculus Pre AP (Master Course)	**Assignment:** 7.5 Classwork (Day 1)

1. Use the figures to evaluate the function if f(x) = **tan** x.

$f(\alpha+\beta)$



Choose the exact value of $f(\alpha+\beta)$ below.

- A. $f(\alpha+\beta) = -\dfrac{8\sqrt{2}+9\sqrt{3}}{5}$
- B. $f(\alpha+\beta) = -\dfrac{4\sqrt{2}+7\sqrt{3}}{5}$
- C. $f(\alpha+\beta) = \dfrac{8\sqrt{2}+9\sqrt{3}}{5}$
- D. $f(\alpha+\beta) = \dfrac{7\sqrt{3}-4\sqrt{2}}{5}$

2. Establish the identity.

$$\frac{\cos(\alpha+\beta)}{\cos\alpha\cos\beta} = 1 - \tan\alpha\tan\beta$$

Choose the sequence of steps below that verifies the identity.

- A. $\dfrac{\cos(\alpha+\beta)}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\sin\beta+\cos\alpha\cos\beta}{\cos\alpha\cos\beta} = \dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta} + \dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta} = 1 - \tan\alpha\tan\beta$
- B. $\dfrac{\cos(\alpha+\beta)}{\cos\alpha\cos\beta} = \dfrac{\cos\alpha\cos\beta+\sin\alpha\sin\beta}{\cos\alpha\cos\beta} = \dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta} + \dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta} = 1 - \tan\alpha\tan\beta$
- C. $\dfrac{\cos(\alpha+\beta)}{\cos\alpha\cos\beta} = \dfrac{\cos\alpha\cos\beta-\sin\alpha\sin\beta}{\sin\alpha\sin\beta} = \dfrac{\cos\alpha\cos\beta}{\sin\alpha\sin\beta} - \dfrac{\sin\alpha\sin\beta}{\sin\alpha\sin\beta} = 1 - \tan\alpha\tan\beta$
- D. $\dfrac{\cos(\alpha+\beta)}{\cos\alpha\cos\beta} = \dfrac{\cos\alpha\cos\beta-\sin\alpha\sin\beta}{\cos\alpha\cos\beta} = \dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta} - \dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta} = 1 - \tan\alpha\tan\beta$

3. Find the exact value of the expression.

$$\sin\left(\sin^{-1}\frac{1}{2} + \cos^{-1}0\right)$$

$\sin\left(\sin^{-1}\frac{1}{2} + \cos^{-1}0\right) =$ ____________

(Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

4. Find the exact value of the expression.

$$\cos\left[\tan^{-1}\frac{40}{9}+\cos^{-1}\frac{4}{5}\right]$$

$\cos\left[\tan^{-1}\frac{40}{9}+\cos^{-1}\frac{4}{5}\right]=$ __________

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

---

5. Solve the equation.

$$\cos\theta+\sqrt{3}\sin\theta=1$$

What is the solution in the interval $0\le\theta<2\pi$? Select the correct choice and fill in any answer boxes in your choice below.

- A. $\theta=\{\quad\}$
  (Simplify your answer. Type an exact answer, using π as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. There is no solution.

6. Show that the difference quotient for f(x) = **sin** x is given by the following.

$$\frac{f(x+h)-f(x)}{h} = \frac{\sin(x+h)-\sin x}{h}$$

$$= \cos x \cdot \frac{\sin h}{h} - \sin x \cdot \frac{1-\cos h}{h}$$

Rewrite **sin** (x + h). Choose the correct answer below.

- A. $\frac{\sin x \cos h - \sin h \cos x - \sin x}{h}$
- B. $\frac{\sin x \sin h - \cos x \cos h - \sin x}{h}$
- C. $\frac{\sin x \cos h + \sin h \cos x - \sin x}{h}$
- D. $\frac{\sin x \sin h + \cos x \cos h - \sin x}{h}$

Rewrite the resulting expression.

- A. $\frac{\sin h \cos x - \sin x(1-\cos h)}{h}$
- B. $\frac{\sin h \cos x + \sin x(1-\cos h)}{h}$
- C. $\frac{\cos x \cos h - \sin x(1-\sin h)}{h}$
- D. $\frac{\sin h \cos x + \sin x(1+\cos h)}{h}$

Rewrite the resulting expression again.

- A. $\frac{\sin h \cos x}{h} + \frac{\sin x(1-\cos h)}{h}$
- B. $\frac{\sin h \cos x}{h} - \frac{\sin x(1-\cos h)}{h}$
- C. $\frac{\sin h \cos x}{h} + \frac{\sin x(1+\cos h)}{h}$
- D. $\frac{\cos x \cos h}{h} - \frac{\sin x(1-\sin h)}{h}$

Therefore, the difference quotient for f(x) = **sin** x is $\cos x \cdot \frac{\sin h}{h} - \sin x \cdot \frac{1-\cos h}{h}$.

1.
A. $f(\alpha+\beta) = -\dfrac{8\sqrt{2}+9\sqrt{3}}{5}$

2.
D. $\dfrac{\cos(\alpha+\beta)}{\cos\alpha\cos\beta} = \dfrac{\cos\alpha\cos\beta - \sin\alpha\sin\beta}{\cos\alpha\cos\beta} = \dfrac{\cos\alpha\cos\beta}{\cos\alpha\cos\beta} - \dfrac{\sin\alpha\sin\beta}{\cos\alpha\cos\beta} = 1 - \tan\alpha\tan\beta$

---

3. $\dfrac{\sqrt{3}}{2}$

---

4. $-\dfrac{84}{205}$

---

5. A. $\theta = \left\{ 0, \dfrac{2\pi}{3} \right\}$

(Simplify your answer. Type an exact answer, using π as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

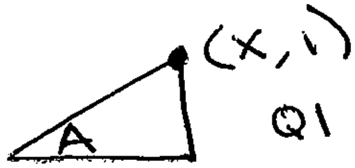
6.
C. $\dfrac{\sin x\cos h + \sin h\cos x - \sin x}{h}$

A. $\dfrac{\sin h\cos x - \sin x(1-\cos h)}{h}$

B. $\dfrac{\sin h\cos x}{h} - \dfrac{\sin x(1-\cos h)}{h}$

7.5 classwork day 1

(1)



Q1

$x^2+y^2=4$

$x^2+(1)^2=4$

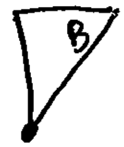
$x^2=3$

$x=\sqrt{3}$

$y=1$

$r=2$

$\tan A=\frac{1}{\sqrt{3}}$



Q3

$(-\frac{1}{3}, y)$

$x^2+y^2=1$

$(-\frac{1}{3})^2+y^2=1$

$y^2=\frac{8}{9}$

$y=\pm\frac{2\sqrt{2}}{3}$

$x=-\frac{1}{3}$

$y=-\frac{2\sqrt{2}}{3}$

$r=1$

$\tan B=\dfrac{\frac{-2\sqrt{2}}{3}}{-\frac{1}{3}}$

$\tan B=2\sqrt{2}$

$$\tan(A+B)=\frac{\tan A+\tan B}{1-\tan A\tan B}$$

$$=\frac{\frac{1}{\sqrt{3}}+2\sqrt{2}}{1-\left(\frac{1}{\sqrt{3}}\right)\left(2\sqrt{2}\right)}=\boxed{-\frac{8\sqrt{2}+9\sqrt{3}}{5}}$$

$\boxed{A}$

7.5 classwork day 1 continued

(2) $$\frac{\cos(A+B)}{\cos A \cos B} = 1 - \tan A \tan B$$

* Formula

$$\frac{\cos A \cos B - \sin A \sin B}{\cos A \cos B} =$$

* split

$$\frac{\cos A \cos B}{\cos A \cos B} - \frac{\sin A \sin B}{\cos A \cos B} =$$

$$1 - \tan A \tan B =$$

$$\boxed{D}$$

7.5 classwork day 1 continued

(3) $\sin\left(\sin^{-1}(1/2) + \cos^{-1}(0)\right)$

$* \sin\theta = 1/2$

$\theta = \boxed{\pi/6}$ $\quad -\pi/2 \le \theta \le \pi/2$

$* \cos\theta = 0$

$\theta = \boxed{\pi/2}, 3\pi/2$ $\quad 0 \le \theta \le \pi$

outside parameter

$\sin\left(\pi/6 + \pi/2\right)$

*Formula

$\sin A \cos B + \cos A \sin B$

$\sin \pi/6 \cos \pi/2 + \cos \pi/6 \sin \pi/2$

$\left(\frac{1}{2}\right)(0) + \frac{\sqrt{3}}{2}(1)$

$= \boxed{\frac{\sqrt{3}}{2}}$

$* \sin\left(\pi/6 + \pi/2\right)$

$\sin\left(2\pi/3\right)$

$\frac{\sqrt{3}}{2}$

7.5 classwork day 1 continued

④ $\cos\left[\tan^{-1}\left(\frac{40}{9}\right) + \cos^{-1}\left(\frac{4}{5}\right)\right]$

A

$\tan\theta = \frac{40}{9} = \frac{y}{x}$

$x^2 + y^2 = r^2$

$(9)^2 + (40)^2 = r^2$

$r = 41$

$\sin\theta = \frac{y}{r} = \frac{40}{41}$

$\cos\theta = \frac{x}{r} = \frac{9}{41}$

B

$* \cos\theta = \frac{4}{5} = \frac{x}{r}$

$x^2 + y^2 = r^2$

$(4)^2 + y^2 = 5^2$

$y = 3$

$\sin\theta = \frac{3}{5}$

$\cos\left(\frac{9}{41} + \frac{4}{5}\right)$

$*$ Formula

$\cos A \cos B - \sin A \sin B$

$\left(\frac{9}{41}\right)\left(\frac{4}{5}\right) - \left(\frac{40}{41}\right)\left(\frac{3}{5}\right) = \boxed{-\frac{84}{205}}$

7.5 classwork day 1 continued

⑤ $\cos\theta + \sqrt{3}\sin\theta = 1$

$$\sqrt{1-\sin^2\theta} + \sqrt{3}\sin\theta = 1$$

$$\sqrt{1-\sin^2\theta} = 1 - \sqrt{3}\sin\theta$$

* square both sides

$$1-\sin^2\theta = 1 - 2\sqrt{3}\sin\theta + 3\sin^2\theta$$

$$0 = 4\sin^2\theta - 2\sqrt{3}\sin\theta$$

$$0 = 2\sin\theta(2\sin\theta - \sqrt{3})$$

$\sin\theta = 0$ $\quad\quad$ $\sin\theta = \frac{\sqrt{3}}{2}$

$\theta = \{0, \pi\}$ $\quad\quad$ $\theta = \{\pi/3, 2\pi/3\}$

$$\boxed{\theta = \{0, 2\pi/3\}}$$

* π and $\pi/3$ do not work when plugged into original equation

7.5 classwork day 1 continued

⑥

$$\frac{\sin(x+h) - \sin x}{h}$$

*use composite Argumet property

$$\frac{\sin x \cosh + \cos x \sin h - \sin x}{h} \qquad \boxed{C}$$

*group sin x

$$\frac{\cos x \sin h - \sin x(1 - \cosh)}{h} \qquad \boxed{A}$$

*split common denominator

$$\frac{\sin h \cos x}{h} - \frac{\sin x(1 - \cosh)}{h} \qquad \boxed{B}$$