Devoir : Omnimaths 12, pages 272-274, nos 2, 6, 8, 10, 13, 17, 19, 22, 25, 27, 29, 31, 38, 43ab
Pré-Calcul, pages 306-308, nos 1e, 2c, 4de, 5abcd, 8abc, 11a, 15ab, 16ab, 19a, 20bc
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Détermine la valeur exacte de chaque expression.

2. $\sin 65^\circ \cos 35^\circ - \cos 65^\circ \sin 35^\circ$

$\sin\left(65^\circ + 35^\circ\right) = \sin 90^\circ = 1$

6. $\cos\frac{7\pi}{12}\cos\frac{\pi}{3} + \sin\frac{7\pi}{12}\sin\frac{\pi}{3}$

$\cos\left(\frac{7\pi}{12} - \frac{\pi}{3}\right) = \cos\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

8. $\cos\left(-10^\circ\right)\cos 35^\circ + \sin\left(-10^\circ\right)\sin 35^\circ$

$\cos\left(-10^\circ - 35^\circ\right) = \cos\left(-45^\circ\right) = \frac{\sqrt{2}}{2}$

Détermine la valeur exacte de chaque expression. Tu dois choisir des valeurs de <A et de <B et appliquer une identité d'addition ou de soustraction appropriée.

10. $\tan 15^\circ$

$$= \tan\left(60^\circ - 45^\circ\right)$$
$$= \frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \tan 45^\circ}$$
$$= \frac{\sqrt{3} - 1}{1 + 1\sqrt{3}} \times \frac{1 - \sqrt{3}}{1 - \sqrt{3}}$$
$$= \frac{\sqrt{3} - 3 - 1 + \sqrt{3}}{1 - \sqrt{3} + \sqrt{3} - 3}$$
$$= \frac{-4 + 2\sqrt{3}}{-2} = 2 - \sqrt{3}$$

13. $\tan 105^\circ$

$$= \tan\left(45^\circ + 60^\circ\right)$$
$$= \frac{1 + \sqrt{3}}{1 - 1\sqrt{3}} \times \frac{1 + \sqrt{3}}{1 + \sqrt{3}}$$
$$= \frac{1 + \sqrt{3} + \sqrt{3} + 3}{1 - \sqrt{3} + \sqrt{3} - 3}$$
$$= \frac{4 + 2\sqrt{3}}{-2} = -2 - \sqrt{3}$$

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Récris chaque expression sous la forme d'une fonction trigonométrique simple.

17. $2\sin\frac{\pi}{6}\cos\frac{\pi}{6}$

$= \sin 2\left(\frac{\pi}{6}\right) = \sin\left(\frac{\pi}{3}\right)$

19. $\cos^2\frac{\pi}{3} - \sin^2\frac{\pi}{3}$

$= \cos\left(\frac{\pi}{3}+\frac{\pi}{3}\right) = \cos\frac{2\pi}{3}$

Utilise les identités d'addition et de soustraction pour prouver chaque identité.

25. $\sin(90° + A) = \cos A$

$\sin 90° \cos A + \cos 90° \sin A = \cos A$

$1\cos A + 0\sin A = \cos A$

$\cos A = \cos A$

27. $\cos(90° - A) = \sin A$

$\cos 90° \cos A + \sin 90° \sin A = \sin A$

$0\cos A + 1\sin A = \sin A$

$\sin A = \sin A$

29. $\sin(\pi + A) = -\sin A$

$\sin\pi\cos A + \cos\pi\sin A = -\sin A$

$0\cos A + (-1)\sin A = -\sin A$

$-\sin A = -\sin A$

31. $\sin\left(\frac{\pi}{2} - A\right) = \cos A$

$\sin\frac{\pi}{2}\cos A - \cos\frac{\pi}{2}\sin A = \cos A$

$1\cos A - 0\sin A = \cos A$

$\cos A = \cos A$

38. Évalue $\tan(A - B)$, sachant que $\tan A = \frac{4}{3}$, $\cos B = \frac{12}{13}$ et que les deux angles se trouvent dans le quadrant I.

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

$r = \sqrt{9+16}$

$r = \sqrt{25}$

$r = \pm 5 \quad r$ est toujours $+$

$\sin A = \frac{4}{5}$

$\cos A = \frac{3}{5}$

$\tan A = \frac{4}{3}$

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

$169 = 144 + y^2$

$25 = y^2$

$y = \pm 5$ quadrant I $y = 5$

$\sin B = \frac{5}{13}$

$\cos B = \frac{12}{13}$

$\tan B = \frac{5}{12}$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B} = \frac{\frac{4}{3} - \frac{5}{12}}{1 + \frac{4}{3}\times\frac{5}{12}} = \frac{\frac{11}{12}}{\frac{14}{9}} = \frac{11}{12}\times\frac{9}{14} = \frac{33}{56}$$

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43. Prouve chaque équation algébriquement. Ensuite, compare les graphiques des fonctions définies par le membre de gauche et le membre de droite de l'équation. Note : les deux fonctions que tu as représentées graphiquement et dessine le graphique obtenu.

a) $\dfrac{1+\cos 2x}{\sin 2x} = \cot anx$

$$\frac{1+\cos\left(x+x\right)}{\sin\left(x+x\right)} = \cot anx$$

$$\frac{1+\cos x\cos x-\sin x\sin x}{\sin x\cos x+\cos x\sin x} = \cot anx$$

$$\frac{1+\cos^2 x-\sin^2 x}{2\sin x\cos x} = \cot anx$$

$$\frac{1-\sin^2 x+\cos^2 x}{2\sin x\cos x} = \cot anx$$

$$\frac{\cos^2 x+\cos^2 x}{2\sin x\cos x} = \cot anx$$

$$\frac{2\cos^2 x}{2\sin x\cos x} = \cot anx$$

$$\frac{\cos x}{\sin x} = \cot anx$$

$$\cot anx = \cot anx$$

b) $\sec^2 x = \dfrac{2}{1+\cos 2x}$

$$\sec^2 x = \frac{2}{1+\cos\left(x+x\right)}$$

$$\sec^2 x = \frac{2}{1+\cos x\cos x-\sin x\sin x}$$

$$\sec^2 x = \frac{2}{1+\cos^2 x-\sin^2 x}$$

$$\sec^2 x = \frac{2}{1-\sin^2 x+\cos^2 x}$$

$$\sec^2 x = \frac{2}{\cos^2 x+\cos^2 x}$$

$$\sec^2 x = \frac{2}{2\cos^2 x}$$

$$\sec^2 x = \sec^2 x$$

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Pré-calcul p. 306

1. Réécris chaque expression sous la forme d'un seul rapport trigonométrique.

e) $8\sin\frac{\pi}{3}\cos\frac{\pi}{3} = 4\left(2\sin\frac{\pi}{3}\cos\frac{\pi}{3}\right) = 4\sin\left(\frac{\pi}{3}+\frac{\pi}{3}\right) = 4\sin\frac{2\pi}{3} = -4$

2. Simplifie chaque expression et donne sa valeur exacte.

c) $\cos^2\frac{\pi}{6} - \sin^2\frac{\pi}{6} = \cos\left(\frac{\pi}{6}+\frac{\pi}{6}\right) = \cos\frac{\pi}{3} = \frac{1}{2}$

4. Réécris chaque expression sous la forme d'un seul rapport trigonométrique.

d) $2\cos^2\frac{\pi}{6} - 1$

$= 2\cos^2\frac{\pi}{6} - \left(\sin^2\frac{\pi}{6} + \cos^2\frac{\pi}{6}\right)$

$= 2\cos^2\frac{\pi}{6} - \sin^2\frac{\pi}{6} - \cos^2\frac{\pi}{6}$

$= \cos^2\frac{\pi}{6} - \sin^2\frac{\pi}{6}$

$= \cos\left(\frac{\pi}{6}+\frac{\pi}{6}\right) = \cos\frac{\pi}{3}$

e) $1 - 2\cos^2\frac{\pi}{12}$

$= \sin^2\frac{\pi}{12} + \cos^2\frac{\pi}{12} - 2\cos^2\frac{\pi}{12}$

$= \sin^2\frac{\pi}{12} - \cos^2\frac{\pi}{12}$

$= -\left(\cos^2\frac{\pi}{12} - \sin^2\frac{\pi}{12}\right)$

$= -\cos\left(\frac{\pi}{12}+\frac{\pi}{12}\right) = -\cos\frac{\pi}{6}$

5. Simplifie chaque expression pour obtenir un seul rapport trigonométrique de base.

a) $\frac{\sin 2x}{2\cos x} = \frac{2\sin x\cos x}{2\cos x} = \sin x$

b) $\cos 2x\cos x + \sin 2x\sin x = \left(\cos^2 x - \sin^2 x\right)\cos x + \left(2\sin x\cos x\right)\sin x$

$= \cos x\left(\cos^2 x - \sin^2 x + 2\sin^2 x\right)$

$= \cos x\left(\cos^2 x + \sin^2 x\right)$

$= 1$

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c)

$$\frac{\cos 2x + 1}{2\cos x} = \frac{\cos^2 x - \sin^2 x + \sin^2 x + \cos^2 x}{2\cos x}$$

$$= \frac{2\cos^2 x}{2\cos x} = \cos x$$

d)

$$\frac{\cos^2 x}{\cos 2x + \sin^2 x} = \frac{\cos^2 x}{\cos^2 x - \sin^2 x + \sin^2 x}$$

$$= \frac{\cos^2 x}{\cos^2 x} = 1$$

8. Détermine la valeur exacte de chaque expression trigonométrique.

a)

$$\cos 75^\circ = \cos\left(30^\circ + 45^\circ\right) = \cos 30^\circ \cos 45^\circ - \sin 30^\circ \sin 45^\circ$$

$$= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4}$$

b)

$$\tan 165^\circ = \tan\left(60^\circ + 60^\circ + 45^\circ\right) = \frac{\tan\left(60^\circ + 60^\circ\right) + \tan 45^\circ}{1 - \tan\left(60^\circ + 60^\circ\right)\tan 45^\circ}$$

$$= \frac{\dfrac{\tan 60^\circ + \tan 60^\circ}{1 - \tan 60^\circ \tan 60^\circ} + 1}{1 - \left(\dfrac{\tan 60^\circ + \tan 60^\circ}{1 - \tan 60^\circ \tan 60^\circ}\right)(1)} = \frac{\dfrac{\sqrt{3} + \sqrt{3}}{1 - \sqrt{3} \times \sqrt{3}} + 1}{1 - \left(\dfrac{\sqrt{3} + \sqrt{3}}{1 - \sqrt{3} \times \sqrt{3}}\right)(1)}$$

$$= \frac{\dfrac{2\sqrt{3}}{1-3} + 1}{1 - \left(\dfrac{2\sqrt{3}}{1-3}\right)(1)} = \frac{\dfrac{2\sqrt{3}}{-2} + 1}{1 - \left(\dfrac{2\sqrt{3}}{-2}\right)} = \frac{-\sqrt{3} + 1}{1 + \sqrt{3}}$$

c)

$$\sin\frac{7\pi}{12} = \sin 105^\circ = \sin\left(60^\circ + 45^\circ\right) = \sin 60^\circ \cos 45^\circ + \cos 60^\circ \sin 45^\circ$$

$$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} + \frac{1}{2} \times \frac{\sqrt{2}}{2} = \frac{\sqrt{6}}{2} + \frac{\sqrt{2}}{2}$$

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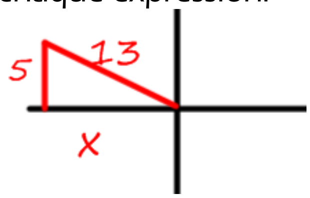
11. L'angle θ se termine dans le quadrant II et $\sin\theta = \frac{5}{13}$. Détermine la valeur exacte de chaque expression.



$$13^2 = x^2 + 5^2$$
$$169 - 25 = x^2$$
$$144 = x^2$$
$$x = \pm 12$$

$$\cos\theta = \frac{-12}{13}$$

a) $\cos 2\theta$

$$\cos^2\theta - \sin^2\theta = \left(\frac{-12}{13}\right)^2 - \left(\frac{5}{13}\right)^2 = \frac{144}{169} - \frac{25}{169} = \frac{119}{169}$$

15. Montre que chaque expression peut se réduire à cos2x.

a) $\cos^4 x - \sin^4 x$

$$\left(\cos^2 x + \sin^2 x\right)\left(\cos^2 x - \sin^2 x\right) = 1\left(\cos^2 x - \sin^2 x\right) = \cos 2x$$

b) $\dfrac{\cos ec^2 x - 2}{\cos ec^2 x}$

$$= \frac{\frac{1}{\sin^2 x} - 2}{\frac{1}{\sin^2 x}} = \frac{1 - 2\sin^2 x}{\sin^2 x} \times \frac{\sin^2 x}{1}$$
$$= \sin^2 x + \cos^2 x - 2\sin^2 x$$
$$= \cos^2 x - \sin^2 x = \cos 2x$$

16. Simplifie chaque expression pour obtenir l'expression équivalente indiquée.

a) $\dfrac{1 - \cos 2x}{2} = \sin^2 x$

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

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b) $\dfrac{4-8\sin^2 x}{2\sin x\cos x} = \dfrac{4}{\tan 2x}$

$$\frac{4\left(1-2\sin^2 x\right)}{2\sin x\cos x} = \frac{4}{\tan 2x}$$

$$\frac{4\left(\sin^2 x+\cos^2 x-2\sin^2 x\right)}{\sin 2x} = \frac{4}{\tan 2x}$$

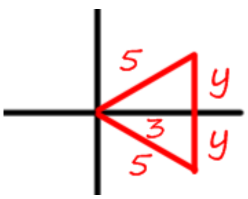
$$\frac{4\left(\cos^2 x-\sin^2 x\right)}{\sin 2x} = \frac{4}{\tan 2x}$$

$$\frac{4\cos 2x}{\sin 2x} = \frac{4}{\tan 2x}$$

$$4\cot an2x = \frac{4}{\tan 2x}$$

$$\frac{4}{\tan 2x} = \frac{4}{\tan 2x}$$

19. a) Détermine la ou les valeurs de $\sin\left(\theta+\dfrac{\pi}{6}\right)$ si $\cos\theta = \dfrac{3}{5}$ et $0 < \theta < 2\pi$



$$5^2 = 3^2 + y^2$$
$$25 - 9 = y^2$$
$$16 = y^2$$
$$y = \pm 4$$

$\sin\theta = \dfrac{-4}{5}$ ou $\sin\theta = \dfrac{4}{5}$

$$\sin\left(\theta+\frac{\pi}{6}\right) = \sin\theta\cos\frac{\pi}{6} + \cos\theta\sin\frac{\pi}{6}$$
$$= \left(\frac{-4}{5}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{3}{5}\right)\left(\frac{1}{2}\right)$$
$$= \frac{-4\sqrt{3}+3}{10}$$

$$\sin\left(\theta+\frac{\pi}{6}\right) = \sin\theta\cos\frac{\pi}{6} + \cos\theta\sin\frac{\pi}{6}$$
$$= \left(\frac{4}{5}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{3}{5}\right)\left(\frac{1}{2}\right)$$
$$= \frac{4\sqrt{3}+3}{10}$$

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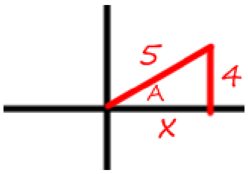
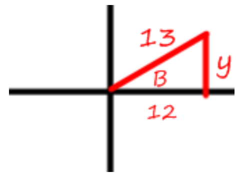
20. Si <A et <B se situent dans le quadrant 1 et que $\sin < A = \frac{4}{5}$ et $\cos < B = \frac{12}{13}$, quelle est la valeur de chaque expression?



$$5^2 = x^2 + 4^2$$
$$25 - 16 = x^2$$
$$9 = x^2$$
$$x = \pm 3$$
$$\sin A = \frac{4}{5}$$
$$\cos A = \frac{3}{5}$$



$$13^2 = 12^2 + y^2$$
$$169 - 144 = y^2$$
$$25 = y^2$$
$$y = \pm 5$$
$$\sin B = \frac{5}{13}$$
$$\cos B = \frac{12}{13}$$

b) $\sin\left(< A + < B\right)$

$$\sin\left(A + B\right) = \sin A \cos B + \cos A \sin B$$
$$= \frac{4}{5} \times \frac{12}{13} + \frac{3}{5} \times \frac{5}{13} = \frac{48}{65} + \frac{15}{65} = \frac{63}{65}$$

c) $\cos 2 < A$

$$\cos 2A = \cos^2 A - \sin^2 A$$
$$= \left(\frac{3}{5}\right)^2 - \left(\frac{4}{5}\right)^2 = \frac{9}{25} - \frac{16}{25} = \frac{-7}{25}$$

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7. Démontre chaque identité.

a) $\frac{\cos ec\, x}{2 \cos x} = \cos ec\, 2x$

$$\frac{\cos ecx}{2 \cos x} = \frac{1}{\sin 2x}$$
$$= \frac{1}{2 \sin x \cos x}$$
$$= \frac{\cos ecx}{2 \cos x}$$

b) $\sin x + \cos x \cot an\, x = \cos ec\, x$

$$\sin x + \cos x \cot an\, x = \cos ec\, x$$
$$\sin x + \cos x \times \frac{\cos x}{\sin x} =$$
$$\frac{\sin^2 x + \cos^2 x}{\sin x} =$$
$$\frac{1}{\sin x} =$$
$$\cos ecx =$$

10. Vérifie graphiquement si chaque équation est une identité, puis démontre l'identité.

b) $\frac{\sin x \cos x}{1 + \cos x} = \frac{1 - \cos x}{\tan x}$

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$$\frac{\sin x\cos x}{1+\cos x}\times\frac{1-\cos x}{1-\cos x}=\frac{1-\cos x}{\tan x}$$
$$\frac{\sin x\cos x\left(1-\cos x\right)}{1-\cos^2 x}=\frac{1-\cos x}{\tan x}$$
$$\frac{\sin x\cos x\left(1-\cos x\right)}{\sin^2 x}=\frac{1-\cos x}{\tan x}$$
$$\frac{1-\cos x}{\tan x}=\frac{1-\cos x}{\tan x}$$

11. Démontre chaque identité.

a) $\dfrac{\sin 2x}{\cos x}+\dfrac{\cos 2x}{\sin x}=\cos ec\, x$

$$\frac{2\sin x\cos x}{\cos x}+\frac{\cos^2 x-\sin^2 x}{\sin x}=\cos ecx$$
$$2\sin x+\frac{\cos^2 x-\sin^2 x}{\sin x}=\cos ecx$$
$$\frac{2\sin^2 x+\cos^2 x-\sin^2 x}{\sin x}=\cos ecx$$
$$\frac{\sin^2 x+\cos^2 x}{\sin x}=\cos ecx$$
$$\frac{1}{\sin x}=\cos ecx$$
$$\cos ecx=\cos ecx$$

b) $\cos ec^2x+\sec^2 x=\cos ec^2x\sec^2 x$

$$\frac{1}{\sin^2 x}+\frac{1}{\cos^2 x}=\cos ec^2x\sec^2 x$$
$$\frac{\cos^2 x+\sin^2 x}{\sin^2 x\cos^2 x}=\cos ec^2x\sec^2 x$$
$$\frac{1}{\sin^2 x\cos^2 x}=\cos ec^2x\sec^2 x$$
$$\cos ec^2x\sec^2 x=\cos ec^2x\sec^2 x$$

c) $\dfrac{\cot anx-1}{1-\tan x}=\dfrac{\cos ecx}{\sec x}$

$$\frac{\frac{\cos x}{\sin x}-1}{1-\frac{\sin x}{\cos x}}=\frac{\cos ecx}{\sec x}$$
$$\frac{\frac{\cos x-\sin x}{\sin x}}{\frac{\cos x-\sin x}{\cos x}}=\frac{\cos ecx}{\sec x}$$
$$\frac{\cos x-\sin x}{\sin x}\times\frac{\cos x}{\cos x-\sin x}=\frac{\cos ecx}{\sec x}$$
$$\frac{\cos ecx}{\sec x}=\frac{\cos ecx}{\sec x}$$

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12. Démontre chaque identité.

a) $\sin\left(90^\circ + \theta\right) = \sin\left(90^\circ - \theta\right)$

$$\sin 90^\circ \cos\theta + \cos 90^\circ \sin\theta = \sin 90^\circ \cos\theta - \cos 90^\circ \sin\theta$$
$$1\cos\theta + 0\sin\theta = 1\cos\theta - 0\sin\theta$$
$$\cos\theta = \cos\theta$$

b) $\sin\left(2\pi - \theta\right) = -\sin\theta$

$$\sin 2\pi \cos\theta - \cos 2\pi \sin\theta = -\sin\theta$$
$$0\cos\theta - 1\sin\theta = -\sin\theta$$
$$-\sin\theta = -\sin\theta$$

13. Démontre que $2\cos x\cos y = \cos\left(x+y\right) + \cos\left(x-y\right)$

$$2\cos x\cos y = \cos x\cos y - \sin x\sin y + \cos x\cos y + \sin x\sin y$$
$$2\cos x\cos y = 2\cos x\cos y$$

16. à l'aide des identités de l'angle double démontre l'identité $\tan x = \dfrac{\sin 4x - \sin 2x}{\cos 4x + \cos 2x}$

$$\tan x = \frac{2\sin 2x\cos 2x - \sin 2x}{\cos^2 2x - \sin^2 2x + \cos 2x}$$
$$\tan x = \frac{\sin 2x\left(2\cos 2x - 1\right)}{\cos^2 2x + \cos 2x - \left(1 - \cos^2 2x\right)}$$
$$\tan x = \frac{\sin 2x\left(2\cos 2x - 1\right)}{\cos^2 2x + \cos 2x - 1 + \cos^2 2x}$$
$$\tan x = \frac{\sin 2x\left(2\cos 2x - 1\right)}{2\cos^2 2x + \cos 2x - 1}$$
$$\tan x = \frac{\sin 2x\left(2\cos 2x - 1\right)}{\left(2\cos 2x + 2\right)\left(2\cos 2x - 1\right)/2}$$
$$\tan x = \frac{\sin 2x}{\cos 2x + 1}$$
$$\tan x = \frac{2\sin x\cos x}{\cos^2 x - \sin^2 x + \cos^2 x + \sin^2 x}$$
$$\tan x = \frac{2\sin x\cos x}{2\cos^2 x}$$
$$\tan x = \tan x$$