Instructor:	Frank Secretain
Course:	Math 1004
Date:	October 14, 2025
Assessment:	Test 2a
Time allowed:	110 minutes
Devices allowed:	Pencil, pen, eraser, calculator
Notes from instructor:	Be neat. Show your work where needed. Box final answers.
Marks allocated:	3 questions worth 20 marks
Percentage of final grade:	20% of final grade

Formula Sheet

Order of Operations

$$ac + bc = c(a + b)$$

exponents

$$a^n a^m = a^{n+m}$$

$$(a^n)^m = a^{nm}$$

$$(ab)^n = a^n b^n$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

radicals

$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

Relative Velocity

$$\vec{v}_{\frac{A}{C}} = \vec{v}_{\frac{A}{B}} + \vec{v}_{\frac{B}{C}}$$

Linear equations (Cramer's rule)

$$x_i = \frac{det(A_i)}{det(A)}$$

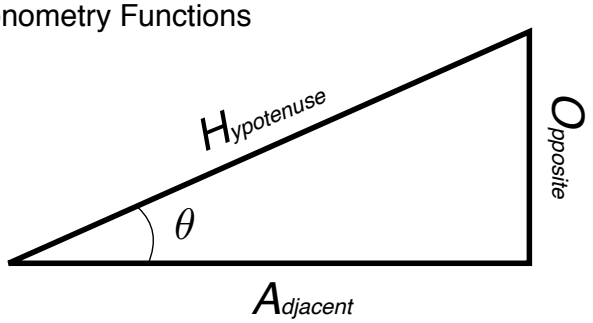
Forms of a 2nd order polynomial

$$y = ax^2 + bx + c$$

$$y = a(x - h)^2 + k$$

$$y = (x - m)(x - n)$$

Trigonometry Functions



$$sin(\theta) = \frac{O}{H} \qquad sin^{-1}\left(\frac{O}{H}\right) = \theta$$

$$cos(\theta) = \frac{A}{H} \qquad cos^{-1}\left(\frac{A}{H}\right) = \theta$$

$$tan(\theta) = \frac{O}{A} \qquad tan^{-1}\left(\frac{O}{A}\right) = \theta$$

Pythagoras Theorem

$$H^2 = O^2 + A^2$$

Unit Conversions

angles

$$2\pi = 6.28\,\text{rad} = 360^o$$

mass

$$1\,\text{kg} = 2.2\,\text{lbs.}$$

lengths

$$1\,\text{mile} = 1.6\,\text{km}$$

$$1\,\text{inch} = 2.54\,\text{cm}$$

$$1\,\text{m} = 3.3\,\text{ft}$$

volumes

$$1\,\text{gallon} = 3.78\,\text{Litres}$$

.(2 marks) Solve for x in the following equation.

$$2x - 7 = 4$$

.(3 marks) Solve for x in the following equation.

$$b + c - 4\alpha x = \Gamma^2$$

$$\sin(\phi) + \frac{3a^2 x}{B} + \Delta = 15.2$$

$$\frac{4 - a}{x} + c = \epsilon$$

$$\frac{(x-x_o)^2}{3}+\frac{(y-y_o)^2}{9}=1$$

$$\frac{1-\cos(2x^2-b)}{4}+2=c^2d$$

(3 marks) Re-write the equation as computer syntax with the minimum number of characters. Do not simplify or rearrange the equation.

$$\frac{z-y}{a-b}+a^{\epsilon+2}+\frac{1}{ab}=0$$

.(2 marks) Solve for x in the following equation.

$$2x - 7 = 4$$ (+7 +7)

$$\frac{2x}{2} = \frac{11}{2}$$

$$x = \frac{11}{2} = 5.5$$

$$\boxed{x = 5.5}$$

.(3 marks) Solve for x in the following equation.

$$b + c - 4\alpha x = \Gamma^2$$ (−Γ² +4αx +4αx −Γ²)

$$\frac{4\alpha x}{4\alpha} = \frac{b + c - \Gamma^2}{4\alpha}$$

$$\boxed{x = \frac{b + c - \Gamma^2}{4\alpha}}$$

$$\sin(\phi) + \frac{3a^2x}{B} + \Delta = 15.2$$

$-\sin(\phi)$ $-\Delta$ $-\sin(\phi)$ $-\Delta$

$$\frac{B}{3a^2}\left(\frac{3a^2x}{B}\right) = \left(15.2 - \sin(\phi) - \Delta\right)\frac{B}{3a^2}$$

$$\boxed{x = \frac{B}{3a^2}\left(15.2 - \sin(\phi) - \Delta\right)}$$

$$\frac{4-a}{x} + c = \epsilon$$

$-c$ $-c$

$$\frac{x}{\epsilon - c}\left(\frac{4-a}{x}\right) = \left(\epsilon - c\right)\frac{x}{\epsilon - c}$$

$$\frac{4-a}{\epsilon - c} = x$$

$$\boxed{x = \frac{4-a}{\epsilon - c}}$$

$$\frac{(x-x_o)^2}{3}+\frac{(y-y_o)^2}{9}=1$$

$-\frac{(y-y_o)^2}{9}$ $-\frac{(y-y_o)^2}{9}$

$$3\left(\frac{(x-x_0)^2}{3}\right)=\left(1-\frac{(y-y_0)^2}{9}\right)3$$

$$\sqrt{(x-x_0)^2}=\sqrt{3\left(1-\frac{(y-y_0)^2}{9}\right)}$$

$+x_0$ $+x_0$

$$x-x_0=\sqrt{3\left(1-\frac{(y-y_0)^2}{9}\right)}$$

$$\boxed{x=\sqrt{3\left(1-\frac{(y-y_0)^2}{9}\right)}+x_0}$$

$$\frac{1-\cos(2x^2-b)}{4}+2=c^2d$$

$$4\left(\frac{1-\cos(2x^2-b)}{4}\right)=(c^2d-2)4$$

$$1-\cos(2x^2-b)=4(c^2d-2)$$

$$\cos^{-1}(\cos(2x^2-b))=\cos^{-1}(1-4(c^2d-2))$$

$$2x^2-b=\cos^{-1}(1-4(c^2d-2))+b$$

$$\frac{2x^2}{2}=\frac{\cos^{-1}(1-4(c^2d-2))+b}{2}$$

$$\sqrt{x^2}=\sqrt{\frac{\cos^{-1}(1-4(c^2d-2))+b}{2}}$$

$$x=\sqrt{\frac{\cos^{-1}(1-4(c^2d-2))+b}{2}}$$

(3 marks) Re-write the equation as computer syntax with the minimum number of characters. Do not simplify or rearrange the equation.

$$\frac{z-y}{a-b}+a^{\epsilon+2}+\frac{1}{ab}=0$$

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(z-y)/(a-b) + a^(e+2) + 1/a/b = 0
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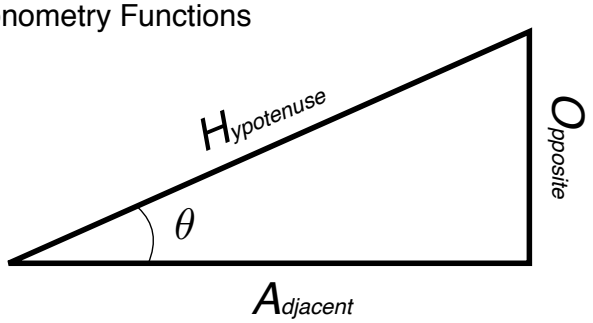
Trigonometry Functions



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.(2 marks) Solve for x in the following equation.

$$3x - 9 = 5$$

.(3 marks) Solve for x in the following equation.

$$a + \beta - 3\alpha x = \Lambda^2$$

$$\cos(\phi) + \frac{3a^2 x}{C} + \Psi = 13.2$$

$$\frac{3 - b}{x} + d = \epsilon$$

$$\frac{(x-x_o)^2}{3}+\frac{(y-y_o)^2}{9}=1$$

$$\frac{1-\cos(2x^2-b)}{4}+2=c^2d$$

(3 marks) Re-write the equation as computer syntax with the minimum number of characters. Do not simplify or rearrange the equation.

$$\frac{z-y}{a-b}+a^{\epsilon+2}+\frac{1}{ab}=0$$

.(2 marks) Solve for x in the following equation.

$$3x - 9 = 5$$

$+9 \quad +9$

$$\frac{3x}{3} = \frac{14}{3}$$

$$x = \frac{14}{3} = 4.\bar{6}$$

$$\boxed{x = 4.\bar{6}}$$

.(3 marks) Solve for x in the following equation.

$$a + \beta - 3\alpha x = \Lambda^2$$

$-\Lambda^2 \quad +3\alpha x \qquad +3\alpha x \quad -\Lambda^2$

$$\frac{3\alpha x}{3\alpha} = \frac{a + \beta - \Lambda^2}{3\alpha}$$

$$\boxed{x = \frac{a + \beta - \Lambda^2}{3\alpha}}$$

$$\cos(\phi) + \frac{3a^2x}{C} + \Psi = 13.2$$

$-\cos(\phi)$ $-\Psi$ $-\cos(\phi)$ $-\Psi$

$$\frac{C}{3a^2}\left(\frac{3a^2x}{C}\right) = \left(13.2 - \cos(\phi) - \Psi\right)\frac{C}{3a^2}$$

$$\boxed{x = \frac{C}{3a^2}\left(13.2 - \cos(\phi) - \Psi\right)}$$

$$\frac{3-b}{x} + d = \epsilon$$

$-d$ $-d$

$$\frac{x}{\epsilon - d}\left(\frac{3-b}{x}\right) = \left(\epsilon - d\right)\frac{x}{\epsilon - d}$$

$$\frac{3-b}{\epsilon - d} = x$$

$$\boxed{x = \frac{3-b}{\epsilon - d}}$$

$$\frac{(x-x_o)^2}{3}+\frac{(y-y_o)^2}{9}=1$$

$-\frac{(y-y_o)^2}{9}$ $-\frac{(y-y_o)^2}{9}$

$$3\left(\frac{(x-x_0)^2}{3}\right)=\left(1-\frac{(y-y_0)^2}{9}\right)3$$

$$\sqrt{(x-x_0)^2}=\sqrt{3\left(1-\frac{(y-y_0)^2}{9}\right)}$$

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$$x-x_0=\sqrt{3\left(1-\frac{(y-y_0)^2}{9}\right)}$$

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$$\frac{1-\cos(2x^2-b)}{4}+2=c^2d$$

$$4\left(\frac{1-\cos(2x^2-b)}{4}\right)=\left(c^2d-2\right)4$$

$$1-\cos(2x^2-b)=4\left(c^2d-2\right)$$

$$\cos^{-1}\left(\cos(2x^2-b)\right)=\cos^{-1}\left(1-4\left(c^2d-2\right)\right)$$

$$2x^2-b=\cos^{-1}\left(1-4\left(c^2d-2\right)\right)+b$$

$$\frac{2x^2}{2}=\frac{\cos^{-1}\left(1-4\left(c^2d-2\right)\right)+b}{2}$$

$$\sqrt{x^2}=\sqrt{\frac{\cos^{-1}\left(1-4\left(c^2d-2\right)\right)+b}{2}}$$

$$x=\sqrt{\frac{\cos^{-1}\left(1-4\left(c^2d-2\right)\right)+b}{2}}$$

(3 marks) Re-write the equation as computer syntax with the minimum number of characters. Do not simplify or rearrange the equation.

$$\frac{z-y}{a-b}+a^{\epsilon+2}+\frac{1}{ab}=0$$

```
(z-y)/(a-b) + a^(ϵ+2) + 1/a/b = 0
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