Instructor:	Frank Secretain
Course:	Math 1004
Date:	October 18, 2024
Assessment:	Test 2
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)

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

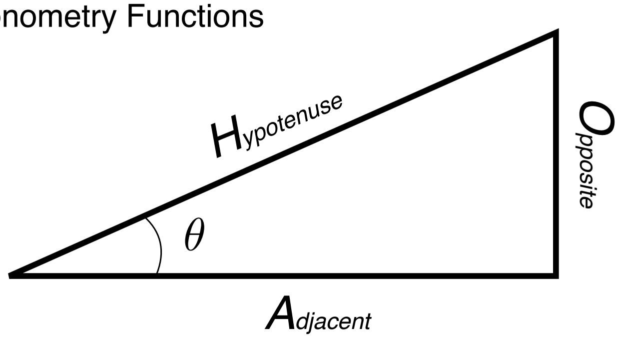
Forms of a 2nd order polynomial

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

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

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

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.

$$4ax - c = b$$

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

$$\Gamma^2 + \frac{ax}{2b^c} - c^3 = 4$$

$$\frac{2x - a}{3 - b} + y = \epsilon - 2$$

$$1 + \gamma^2 + \Delta = \sin(2yx^2 - 1)$$

$$\frac{\sin(x^2 - 1) - 4}{f^2 - 1} + y - c^2 = t$$

$$\frac{1 - \cos(2bx^2 - 1)}{b - 1} + 3\gamma^2 - 1 = 0$$

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

$$2a^2 + \frac{1 - x}{2a} + 2^{n-1} = 0$$

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

$$4ax - c = b$$

$+c$ $+c$

$$\frac{4ax}{4a} = \frac{b+c}{4a}$$

$$x = \frac{b+c}{4a}$$

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

$$\Gamma^2 + \frac{ax}{2b^c} - c^3 = 4$$

$-\Gamma^2$ $+c^3$ $+c^3$ $-\Gamma^2$

$$\frac{2b}{a}\left(\frac{ax}{2b^c}\right) = \left(4 + c^3 - \Gamma^2\right)\frac{2b}{a}$$

$$x = \frac{2b^c}{a}\left(4 + c^3 - \Gamma^2\right)$$

$$\frac{2x-a}{3-b}+y=\epsilon-2$$

$-y$ $-y$

$$(3-b)\left(\frac{2x-a}{3-b}\right)=(\epsilon-2-y)(3-b)$$

$$2x-a=(3-b)(\epsilon-2-y)$$

$+a$ $+a$

$$\frac{2x}{2}=\frac{(3-b)(\epsilon-2-y)+a}{2}$$

$$\boxed{x=\frac{(3-b)(\epsilon-2-y)+a}{2}}$$

$$1+\gamma^2+\Delta=\sin(2yx^2-1)$$

$$\sin^{-1}(\sin(2yx^2-1))=\sin^{-1}(1+\gamma^2+\Delta)$$

$$2yx^2-1=\sin^{-1}(1+\gamma^2+\Delta)$$

$+1$ $+1$

$$\frac{2yx^2}{2y}=\frac{\sin^{-1}(1+\gamma^2+\Delta)+1}{2y}$$

$$\sqrt{x^2}=\sqrt{\frac{\sin^{-1}(1+\gamma^2+\Delta)+1}{2y}}$$

$$\boxed{x=\sqrt{\frac{\sin^{-1}(1+\gamma^2+\Delta)+1}{2y}}}$$

$$\frac{\sin(x^2-1)-4}{f^2-1}+y-c^2=t$$

$-y \quad +c^2 \qquad -y \quad +c^2$

$$(f^2-1)\left(\frac{\sin(x^2-1)-4}{f^2-1}\right)=(t-y+c^2)(f^2-1)$$

$$\sin(x^2-1)-4 \overset{+4}{=} (f^2-1)(t-y+c^2)^{+4}$$

$$\sin^{-1}(\sin(x^2-1))=\sin^{-1}((f^2-1)(t-y+c^2)+4)$$

$$x^2-1 \overset{+1}{=} \sin^{-1}((f^2-1)(t-y+c^2)+4)^{+1}$$

$$\sqrt{x^2}=\sqrt{\sin^{-1}((f^2-1)(t-y+c^2)+4)+1}$$

$$\boxed{x=\sqrt{\sin^{-1}((f^2-1)(t-y+c^2)+4)+1}}$$

$$\frac{1-\cos(2bx^2-1)}{b-1}+3\gamma^2-1=0$$

$-3\gamma^2+1 \quad -3\gamma^2+1$

$$(b-1)\left(\frac{1-\cos(2bx^2-1)}{b-1}\right)=(1-3\gamma^2)(b-1)$$

$$1-\cos(2bx^2-1)=(b-1)(1-3\gamma^2)$$

$$-1\left(-\cos(2bx^2-1)\right)=\left((b-1)(1-3\gamma^2)-1\right)(-1)$$

$$\cos^{-1}\left(\cos(2bx^2-1)\right)=\cos^{-1}\left(1-(b-1)(1-3\gamma^2)\right)$$

$$2bx^2-1=\cos^{-1}\left(1-(b-1)(1-3\gamma^2)\right)$$

$$\frac{2bx^2}{2b}=\frac{\cos^{-1}\left(1-(b-1)(1-3\gamma^2)\right)+1}{2b}$$

$$\sqrt{x^2}=\sqrt{\frac{\cos^{-1}\left(1-(b-1)(1-3\gamma^2)\right)+1}{2b}}$$

$$\boxed{x=\sqrt{\frac{\cos^{-1}\left(1-(b-1)(1-3\gamma^2)\right)+1}{2b}}}$$

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

$$2a^2+\frac{1-x}{2a}+2^{n-1}=0$$

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2*a^2 + (1-x)/2/a + 2^(n-1) = 0
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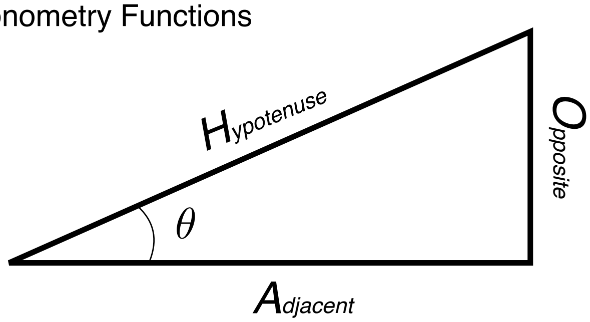

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.(2 marks) Solve for x in the following equation.

$$7abx - 5 = c$$

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

$$\sin(\theta) + \frac{2x}{as^2} - f^n = 5$$

$$y + \frac{ax - 2}{b - 2} = \gamma + 3$$

$$5 - \Gamma^3 + \delta = \cos(3x^2 - 1)$$

$$\frac{1-\cos(2bx^2-1)}{b-1}+3\gamma^2-1=0$$

$$\frac{\sin(x^2-1)-4}{f^2-1}+y-c^2=t$$

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

$$\frac{1-x}{5b}-2b^3+a^{n-3}=0$$

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

$$7abx - 5 = c$$

$+5 \quad +5$

$$\frac{7abx}{7ab} = \frac{c+5}{7ab}$$

$$x = \frac{c+5}{7ab}$$

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

$-\sin(\theta) \quad +f^n \quad -\sin(\theta) \quad +f^n$

$$\sin(\theta) + \frac{2x}{as^2} - f^n = 5$$

$$\frac{as^2}{2}\left(\frac{2x}{as^2}\right) = \left(5 - \sin(\theta) + f^n\right)\frac{as^2}{2}$$

$$x = \frac{as^2}{2}\left(5 - \sin(\theta) + f^n\right)$$

$$y + \frac{ax-2}{b-2} = \gamma + 3$$

$-y \quad -y$

$$(b-2)\left(\frac{ax-2}{b-2}\right) = (\gamma + 3 - y)(b-2)$$

$$ax - 2 = (\gamma + 3 - y)(b-2)$$

$+2 \quad +2$

$$\frac{ax}{a} = \frac{(\gamma + 3 - y)(b-2) + 2}{a}$$

$$\boxed{x = \frac{(\gamma + 3 - y)(b-2) + 2}{a}}$$

$$5 - \Gamma^3 + \delta = \cos(3x^2 - 1)$$

$$\cos^{-1}(\cos(3x^2 - 1)) = \cos^{-1}(5 - \Gamma^3 + \delta)$$

$$3x^2 - 1 = \cos^{-1}(5 - \Gamma^3 + \delta)$$

$+1 \quad +1$

$$\frac{3x^2}{3} = \frac{\cos^{-1}(5 - \Gamma^3 + \delta) + 1}{3}$$

$$\sqrt{x^2} = \sqrt{\frac{\cos^{-1}(5 - \Gamma^3 + \delta) + 1}{3}}$$

$$\boxed{x = \sqrt{\frac{\cos^{-1}(5 - \Gamma^3 + \delta) + 1}{3}}}$$

$$\frac{1-\cos(2bx^2-1)}{b-1}+3\gamma^2-1=0 \quad {}^{-3\gamma^2 \; +1 \quad +1 \; -3\gamma^2}$$

$$\cancel{(b-1)}\left(\frac{1-\cos(2bx^2-1)}{\cancel{b-1}}\right)=(1-3\gamma^2)(b-1)$$

$$1-\cos(2bx^2-1)^{+\cos(2bx^2-1)\,-(1-3\gamma^2)(b-1)}=(1-3\gamma^2)(b-1)^{+\cos(2bx^2-1)\,-(1-3\gamma^2)(b-1)}$$

$$\cos^{-1}\left(1-(1-3\gamma^2)(b-1)\right)=\cos^{-1}\left(\cos(2bx^2-1)\right)$$

$$\cos^{-1}\left(1-(1-3\gamma^2)(b-1)\right)^{+1}=2bx^2-1^{+1}$$

$$\frac{2bx^2}{2b}=\frac{\cos^{-1}\left(1-(1-3\gamma^2)(b-1)\right)+1}{2b}$$

$$\sqrt{x^2}=\sqrt{\frac{\cos^{-1}\left(1-(1-3\gamma^2)(b-1)\right)+1}{2b}}$$

$$\boxed{x=\sqrt{\frac{\cos^{-1}\left(1-(1-3\gamma^2)(b-1)\right)+1}{2b}}}$$

$$\frac{\sin(x^2-1)-4}{f^2-1}+y-c^2=t$$

$-y \quad +c^2 \qquad -y \quad +c^2$

$(f^2-1)\left(\frac{\sin(x^2-1)-4}{f^2-1}\right)=(t-y+c^2)(f^2-1)$

$\sin(x^2-1)-4 \;{}^{+4} = (t-y+c^2)(f^2-1)\;{}^{+4}$

$\sin^{-1}(\sin(x^2-1)) = \sin^{-1}((t-y+c^2)(f^2-1)+4)$

$x^2-1 \;{}^{+1} = \sin^{-1}((t-y+c^2)(f^2-1)+4)\;{}^{+1}$

$\sqrt{x^2}=\sqrt{\sin^{-1}((t-y+c^2)(f^2-1)+4)+1}$

$$x=\sqrt{\sin^{-1}((t-y+c^2)(f^2-1)+4)+1}$$

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

$$\frac{1-x}{5b}-2b^3+a^{n-3}=0$$

(1-x)/5/b - 2*b^3 + a^(n-3) = 0