

Instructor: Frank Secretain
Course: Math 101
Date: October 16, 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)

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

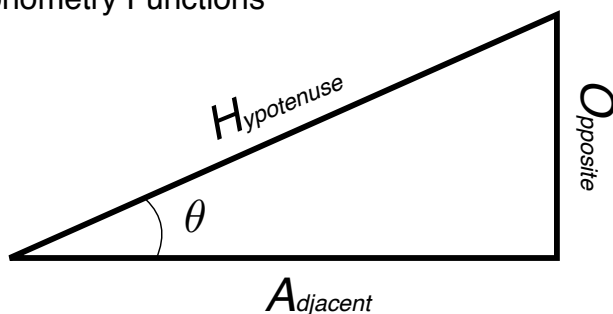
Forms of a 2nd order polynomial

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

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

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

Trigonometry Functions



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

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

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

Unit Conversions

angles

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

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

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

Pythagoras Theorem

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

.(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.

$$4ax - c^{\times c} = b^{\times c}$$

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

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

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

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

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

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

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

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

$$2x-a = (3-b)(e-2-y)$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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