Instructor:	Frank Secretain
Course:	Math 101
Assessment:	Test 3
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:	2 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)

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

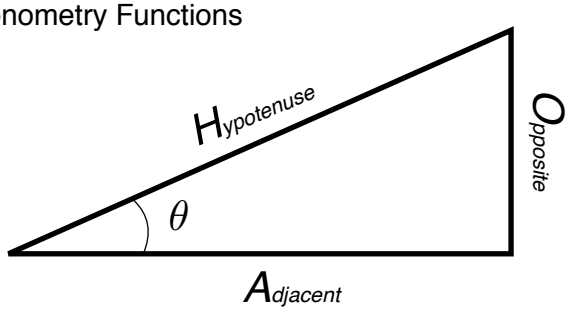
Forms of a 2nd order polynomial

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

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

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

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

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

.(3 marks each) Solve for x in the following equations.

$$1 - \frac{4(x+1)}{3(x-1)} = 7$$

$$\frac{a+b}{\cos(\theta)} - \frac{1}{x} = 0$$

$$1 - x = \frac{4(x-3)}{2x}$$

$$\frac{x-1}{x+1} = \eta + T_o$$

(4 marks each) Solve for x and y in the following equations.

$$5x - 9 = 3y$$

$$x + y - 4 = 2x - y$$

$$\frac{3(x-y)+3}{2x-y}+4=2$$

$$\frac{1}{x}-\frac{1}{y}=0$$

.(3 marks each) Solve for x in the following equations.

$$1 - \frac{4(x+1)}{3(x-1)} = 7$$

$$-\frac{4(x+1)}{3(x-1)} = 6$$

$$-4(x+1) = 18(x-1)$$

$$-4x - 4 = 18x - 18$$

$$-22x = -14$$

$$x = \frac{14}{22} = \frac{7}{11} = 0.\overline{63}$$

$$\frac{a+b}{\cos(\theta)} - \frac{1}{x} = 0$$

$$\frac{x(a+b)}{\cos\theta} - 1 = 0$$

$$x(a+b) = \cos\theta$$

$$x = \frac{\cos\theta}{a+b}$$

$$1 - x = \frac{4(x-3)}{2x}$$

$$2x - 2x^2 = 4x - 12$$

$$2x^2 + 2x - 12 = 0$$

$$x^2 + x - 6 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{(2)^2 - 4(2)(-12)}}{2(2)}$$

$$= \frac{-2 \pm 10}{4} = 2, -3$$

$$\boxed{x = 2, -3}$$

$$\frac{x-1}{x+1} = \eta + T_o$$

$$x - 1 = (\eta + T_o)(x+1)$$

$$x - 1 = (\eta + T_o)x + (\eta + T_o)$$

$$x - 1 = \eta x + T_o x + \eta + T_o$$

$$x - \eta x - T_o x = 1 + \eta + T_o$$

$$x(1 - \eta - T_o) = 1 + \eta + T_o$$

$$\boxed{x = \frac{1 + \eta + T_o}{1 - \eta - T_o}}$$

(4 marks each) Solve for x and y in the following equations.

$$5x - 9 = 3y \quad (1)$$

$$x + y - 4 = 2x - y \quad (2)$$

simplify (2)

$$-4 = x - 2y \quad (2a)$$

solve for x in (2a)

$$x = 2y - 4 \quad (2b)$$

sub (2b) into (1)

$$5[2y - 4] - 9 = 3y$$

$$10y - 20 - 9 = 3y$$

$$7y = 29$$

$$\boxed{y = \frac{29}{7} = 4.\overline{142857}} \quad (1a)$$

sub (1a) into (2b)

$$x = 2\left[\frac{29}{7}\right] - 4$$

$$= \frac{58}{7} - 4\left(\frac{7}{7}\right)$$

$$= \frac{58 - 28}{7}$$

$$\boxed{x = \frac{30}{7} = 4.\overline{285714}}$$

$$\frac{3(x-y)+3}{2x-y}+4=2 \qquad (1)$$

$$\frac{1}{x}-\frac{1}{y}=0 \qquad (2)$$

simplify (1)

$$3(x-y)+3=-2(2x-y)$$

$$3x-3y+3=-4x+2y$$

$$7x-5y=-3 \qquad (1a)$$

simplify (2)

$$1-\frac{x}{y}=0$$

$$y-x=0$$

$$x=y \qquad (2a)$$

sub (2a) into (1a)

$$7[y]-5y=-3$$

$$2y=-3$$

$$\boxed{y=-\frac{3}{2}=-1.5} \qquad (1b)$$

sub (1b) into (2a)

$$\boxed{x=-\frac{3}{2}=-1.5}$$