Math 1470 – Fall 2012 Names Todd

Final Review

For full credit **show all your work** and **circle your answer.**

Solve the following:

1) Solve and, if possible, write your answer using both inequality notation and interval notation.

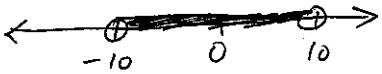
$\sqrt{x^2} < 10$

$-x < 10$ or $x < 10$

$x > -10$

$-10 < x < 10$

$(-10, 10)$

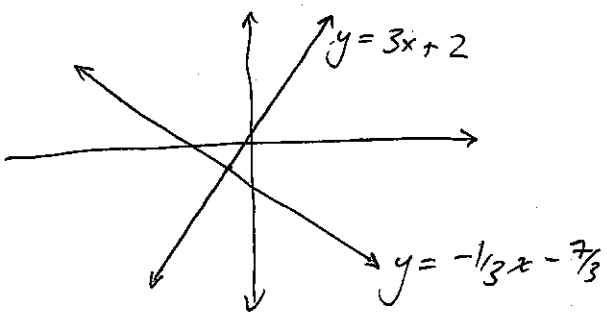


2) Find a line perpendicular to $y = 3x + 2$ and passing through the point (2,-3). Graph both and provide an equation for the new line in slope intercept form.

$-3 = -1/3(2) + b$

$-2\frac{1}{3} = b$ $m = -1/3$

$y = -1/3x - 2\frac{1}{3}$



3) Divide $(2x^7 - 5x^3 + 3) \div (x - 4)$

4	2	0	0	0	-5	0	0	3
		8	32	128	512	2028	8112	32448
	2	8	32	128	507	2028	8112	32451

$2x^6 + 8x^5 + 32x^4 + 128x^3 + 507x^2 + 2028x + 8112$

$r = 32451$

4) Find all roots exactly for the polynomial:

$P(x) = x^4 + 3x^3 - 1x^2 - 3x.$

$x(x^3 + 3x^2 - 1x - 3)$

$= x(x-1)(x^2 + 4x + 3)$

$= x(x-1)(x+1)(x+3)$

$x = 0$ is a root

$x = 1$ is a root

1	1	3	-1	-3
		1	4	3
	1	4	3	0

$x = -1$ & $x = -3$ are roots.

5) Solve exactly:

$\ln 6 - \ln x = 2$

$\ln \frac{6}{x} = 2$

$e^{\ln \frac{6}{x}} = e^2$

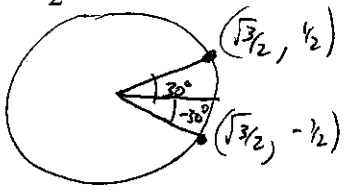
$\frac{6}{x} = e^2$

$6 = e^2 \cdot x$

$\frac{6}{e^2} = x$

6) Solve exactly for all values of Theta:

$\cos \Theta = \frac{\sqrt{3}}{2}$



$\Theta = 30° + 360n$

or

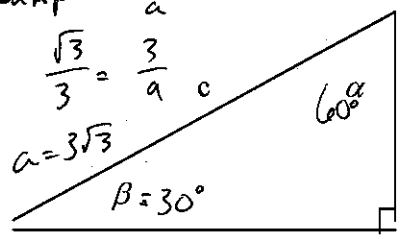
$\Theta = -30° + 360n$

$\Theta = \pi/6 + 2k\pi$

or

$\Theta = -\pi/6 + 2k\pi$

7) Find the unknown side lengths **AND** unknown angle measures of the triangle below if b=3 inches and $\alpha = 60°$.



a

$\tan\beta = \frac{3}{a}$

$\frac{\sqrt{3}}{3} = \frac{3}{a}$

$\sin\beta = \frac{3}{c}$

$\frac{1}{2} = \frac{3}{c}$

$6 = c$

$\alpha = 60°$ $a = 3\sqrt{3}$ inches

$\beta = 30°$ $b = 3$ inches

$\gamma = 90°$ $c = 6$ inches

✓: $a^2 + b^2 = c^2$

$(3\sqrt{3})^2 + 3^2 = 6^2$

$27 + 9 = 36$ ✓

8) Simplify to a single expression with coefficient of 1.

$2\log_b x - \log_b y =$

$\log_b x^2 - \log_b y =$

$\log_b \frac{x^2}{y}$

9) Verify the following identity:

$\sin^2 x \neq \cos(2x)$ They are NOT equal, look at graphs.

10) Solve the following to four decimal places $\sin 2x = 2\cos x$

$(\pi/2 + k\pi)$

$x = 1.5708$

OR

$x = 4.7124$

OR

11) Solve: $\frac{3a-1}{a^2+4a+4} - \frac{3}{a^2+2a} = \frac{3}{a}$

$\frac{3a^2 - 1a - 3a - 6}{a(a+2)(a+2)} = \frac{3a^2+12a+12}{a(a+2)(a+2)}$

$-4a - 6 = 12a + 12$

$-18 = 16a$

$-9/8 = a$

12) Solve the system of equations using a matrix. Show the matrix you used!

$5x + 2y - z = 8$

$5x - 2y + 5z = 32$

$x + 2y + z = 10$

$\begin{bmatrix} 5 & 2 & -1 & 8 \\ 5 & -2 & 5 & 32 \\ 1 & 2 & 1 & 10 \end{bmatrix}$

$x = 2$

$y = 1.5$

$z = 5$

13) In an arithmetic sequence ~~$a_4 = 40$~~ and $a_{10} = 94$. Find the first five terms of the sequence:

$a_1 = 13$

$a_2 = 22$

$a_3 = 31$

$a_4 = 40$

$a_5 = 49$

94 − 40 = 54 ÷ 6 terms = +9/term

14) Find the sum of:

$\sum_{i=2}^{7} 2i^2$

i	$2i^2$	Σ
2	8	
3	18	26
4	32	58
5	50	108
6	72	180
7	98	278

15) Determine whether the sequence is geometric, arithmetic, or neither. Then find the common ratio r if its geometric, the common difference d if the sequence is arithmetic AND a formula.

8, 12, 18, 27, …

+4 +6 +9 ← Each going up 1.5 times

$a_n = 8 \cdot (1.5^{n-1})$

∴ Geometric Sequence.

$r = 1.5$