Math A30 Review

1. System of Equations:

a) Solve using the addition/subtraction method:

$3x + 4y = 17$
$-5x + 7y = -1$

b) Solve using the substitution method:

$-3x + 2y = -10$
$4x - 3y = 13$

c) Solve the following system graphically:

$5x + 3y = -2$
$-3x + 4y = -14$

d) Classify the following systems:

1) $5x + 3y = 12$
$10x + 6y = 30$

2) $5x + 3y = 12$
$-10x - 6y = -24$

3) $5x + 3y = 12$
$10x - 6y = 12$

e) Solve using the method of your choice:

$$\frac{5}{6}x - \frac{1}{5}y = 16$$
$$\frac{3}{4}x + \frac{2}{15}y = 5$$

f) Determine the system that defines the following problems: (Do not solve)

a) The sum of two numbers is 12. Three times the larger minus 6 is equal to 5 times the smaller. What are the numbers?
b) The total number of people attending a concert was 1200. If adult tickets cost $15.00 and student tickets cost $10.00 and the total receipts were $16,500, how many adults attended the concert?
c) The perimeter of a rectangular playing field was 400m. The length of the rectangle exceeds three times the width by 10 meters. Find the dimensions of the rectangle.

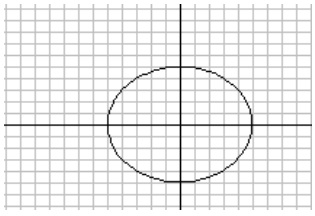
2. Functions:

a) Given: $f(x) = 3x - 2, g(x) = x^2 - 1, h(x) = x^3$
Determine:

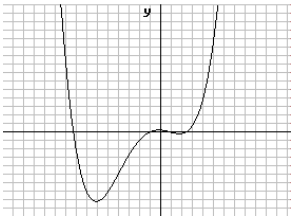
a) f(2) + g(3)
b) 3h(2) - g(-3)
c) g(2) *f(-4)
d) f(g(-2))
e) $(f(3))^2$
f) g(f(h(2)))

b) Which of the following are functions:

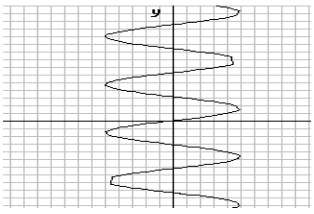
a)



b)



c)

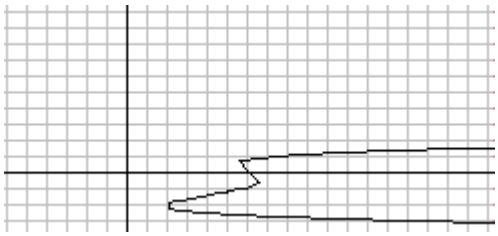


d) {(-3, 5), (-2, 5), (4, 5)}
e) {(5, -3), (5, -2), (5, 4)}
f) y = 3x - 5

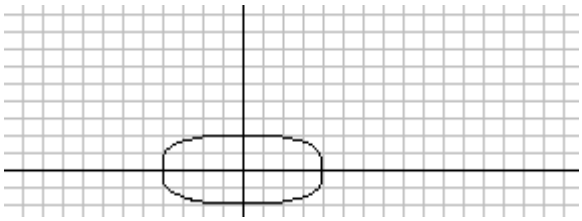
g) $x^2 + y^2 = 25$ h) $x^2 + y = 16$

c) Is the following a one-to-one or a many-to-one relationship

a)



b)



d) Given the points (-4, 5) and (3, -7), determine:

a) the slope of the line joining the two points
b) the midpoint of the line segment defined by the two points
c) the distance between the two points
d) the slope of a line parallel to the given two points
e) the slope of a line perpendicular to the given two points

e) Given the equation 6x - 7y = 13, determine the slope and the y-intercept

f) Determine the equation of the line given

1. m = 2/3 and b = -2
2. m = 4/5 and the point containing the y-intercept (0, 7)
3. m = -2/3 and the point (4, -2)
4. the two points (2, 9) and (-4, 3)
5. parallel to the line 2x - y = 5 and passing through the point (6, -1)
6. perpendicular bisector of the line segment defined by the points (4, 9) and (-6, 3)
7. through the point (-4,5) and parallel to the x-axis

g) Convert the following into the form $y = a(x - p)^2 + q$

a) $y = 2x^2 + 5x - 3$ b) $y = x^2 + 4x - 5$

h) For each of the following determine the required information:

a) $y = 2(x - 3)^2 + 1$ b) $y = -3(x + 1)^2 - 2$

a) the value of "a", "p" and "q"
b) the direction the graph opens
c) whether the graph has a maximum or minimum value
d) the maximum or minimum value
e) the axis of symmetry
f) the coordinates of the vertex
g) the concavity of the function
h) the y-intercepts
i) the x-intercepts
j) the domain of the function
k) the range of the function
l) sketch the graph

i) 1. If the quadratic function $y = a(x + 2)^2 - 8$ passes through the point (5, -9), find the value of "a".

2. If the quadratic function $y = \frac{1}{2}(x + 6)^2 + q$ has a y-intercept of 11, find the value of "q"
3. Use the vertex formula to determine the coordinates of the vertex for the quadratic equation $y = -7x^2 + 5x - 3$

j) 1. If x varies inversely as y and if y = 10 when x = 4, find the value of y when x = 16.
2. Sketch the graph of xy = 6. Identify the domain and range.
3. The intensity of light varies as the square of the distance the light source is from the object. If the intensity is 6 units at a distance of 20cm, what is the intensity at a distance of 5 cm?

Factoring and Polynomials

a) Factor

1. x^2-81 2. x^4-625 3. $(x+2)^2-49$
4. $x^2-7x+12$ 5. $x^2+11x+30$ 6. $x^2-3x-54$
7. $x^2+2x-63$ 8. $3x^2+5x+2$ 9. $4x^2-7x+3$
10. $5x^2-2x-7$ 11. $12x^2+5x-2$ 12. x^3+1
13. x^6-27 14. $x^2-8x+16-y^2$ 15. x^2-9y^2+4-4x

b) Using Synthetic Substitution

1. If $f(x)=x^3-4x^2-7x+10$, determine f(2).
2. If $f(x)=x^3+5x^2-9x-6$ determine the remainder when the function is divided by (x + 4).
3. Prove that (x – 5) is a factor of $x^3-4x^2-7x+10$
4. Factor $x^4-15x^2-10x+24$

c) Simplify

1. $\dfrac{10xy}{20x-5y}$ 2. $\dfrac{x^2-7x-8}{x^3+1}$ 3. $\dfrac{25-16x^2}{12x-5}$
4. $\dfrac{12x+6y}{4xy}\bullet\dfrac{2x^3y^3}{6x^2+3xy}$ 5. $\dfrac{x^2+7x+12}{x^2-5x+4}\bullet\dfrac{x^2-x-12}{x^2+6x+9}$
6. $\dfrac{m-3}{3}\bullet\dfrac{6}{m^2-9}\div\dfrac{4}{m+3}$ 7. $\dfrac{6x^2+5x-6}{12x-3x^2}\bullet\dfrac{12x^2-x-6}{6x^2+13x+6}\div\dfrac{12x^2-17x+6}{2x^2-8x}$
8. $\dfrac{3}{a+5}-\dfrac{2}{a+5}$ 9. $\dfrac{2}{x-5}-\dfrac{x+15}{x^2-25}$
10. $\dfrac{2}{a+1}+\dfrac{3}{a+2}+\dfrac{1}{a}$ 11. $\dfrac{5x}{4-x^2}+\dfrac{8x}{x^2+2x-8}$

Exponents and Radicals

A. 1. $32^{\frac{1}{5}}$ 2. $\left(\dfrac{9}{16}\right)^{\frac{1}{2}}$ 3. $4^{-\frac{1}{2}}$ 4. $\left(\dfrac{256}{625}\right)^{\frac{3}{4}}$ 5. $(-27)^{\frac{1}{3}}$ 6. $(-243)^{\frac{-6}{5}}$ 7. $x^{\frac{1}{3}}x^{\frac{5}{3}}$

8. $\left(x^2\right)^{\frac{1}{3}}$ 9. $\left(3x^2y^3\right)^{\frac{2}{5}}$ 10. $\left(x^{\frac{2}{3}}y^{\frac{1}{2}}\right)^{\frac{3}{4}}$ 11. $x^{\frac{2}{3}}x^{\frac{1}{2}}$ 12. $x^2x^{-\frac{1}{3}}x^{\frac{1}{2}}$ 13. $\left(x^2y^3\right)^{\frac{1}{2}}\left(x^3y^2\right)^{\frac{1}{3}}$

14. $\dfrac{x^{\frac{5}{3}}}{x^{\frac{2}{3}}}$ 15. $\dfrac{x^{\frac{2}{3}}}{x^{\frac{4}{3}}}$ 16. $\dfrac{x^{\frac{1}{2}}y^{\frac{2}{3}}}{x^{\frac{1}{3}}y^{\frac{3}{2}}}$ 17. $\dfrac{\left(x^{\frac{1}{2}}\right)^3}{\left(x^{\frac{2}{3}}\right)^2}$ 18. $\left(7^0\right)^{-\frac{2}{3}}$ 19. $5^{x+y}\bullet5^{x+y}$ 20. $\left(3^{x-y}\right)^{x+y}$

B.

1. $-\sqrt{144}$ 2. $\sqrt[4]{625}$ 3. $\sqrt[6]{x^{12}y^{18}z^{30}}$ 4. $\sqrt[5]{x^9y^4}$ 5. $\dfrac{3}{\sqrt[4]{x^2y}}$ 6. $5\sqrt{3}+2\sqrt{7}-8\sqrt{3}+\sqrt{7}$

7. $\sqrt{32}+\sqrt{98}$ 8. $\sqrt[3]{x}+\sqrt{y}-2\sqrt[3]{x}$ 9. $\sqrt[3]{27}+\sqrt[3]{125}$ 10. $x^2\sqrt[4]{xy^5}-y\sqrt[4]{x^9y}$

11. $\sqrt[3]{x}\bullet\sqrt[3]{x^2}$ 12. $2\sqrt[4]{2}\bullet3\sqrt[4]{5}$ 13. $\left(\sqrt[4]{5}\right)^4$ 14. $\dfrac{\sqrt[3]{12}}{\sqrt[3]{2}}$ 15. $\dfrac{\sqrt[5]{x^{18}}}{\sqrt[5]{x^3}}$ 16. $\dfrac{2x}{\sqrt{x}}$

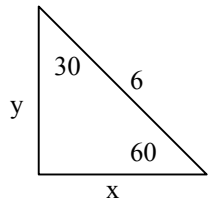
17. $\dfrac{\sqrt[3]{2}}{\sqrt[3]{2^2}}$ 18. $\dfrac{\sqrt[5]{xy}}{\sqrt[5]{x^3y^2}}$ 19. $\dfrac{\sqrt[3]{x}}{\sqrt{x}}$ 20. $\sqrt[3]{x^2}\bullet\sqrt{x}$ 21. $\left(\sqrt{5}-3\right)\left(\sqrt{5}+3\right)$

22. $\left(\sqrt{2}-\sqrt{7}\right)^2$ 23. $\left(\sqrt[3]{2}+\sqrt[3]{4}\right)\left(\sqrt[3]{4}+\sqrt[3]{5}\right)$ 24. $\dfrac{3}{\sqrt{5}+1}$ 25. $\dfrac{\sqrt{5}}{\sqrt{3}+2}$ 26. $\dfrac{\sqrt{3}-\sqrt{2}}{\sqrt{5}+\sqrt{3}}$

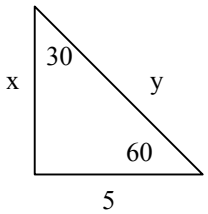
Angles:

1. Determine the midpoint of the points (4, -7) and (-8, 9)
2. Determine the distance between the points (8, 6) and (-4, 2)
3. State 2 positive and 2 negative coterminal angles for a) $115°$ and b) $-203°$
4. State the reference angle for: a) $120°$, b) $310°$, c) $-153°$
5. State the expression as a function of a positive acute angle less than $45°$
   a) $\sin 94°$ b) $\tan 300°$ c) $\cos(-150°)$
6. Determine the angle measure (all possible angles) if:
   a) $\sin\theta = 0.9142$ b) $\cos\theta = -0.4172$ c) $\cot\theta = 4.9216$ d) $\csc\theta = -2.1631$
7. Determine the exact value of:
   a) $\sin 300°$ b) $\cos 150°$ c) $\tan(-135°)$ d) $\cos 675°$
8. Simplify using exact values:
   a) $\sin 330° + \cos 225°$ b) $2\tan 135° - \sec 45°$
9. Determine the six trig functions for the angle defined by the terminal ray passing through (-8, 3).
10. If $\cos\theta = \dfrac{2}{3}$ and lies in the 4th quadrant, determine $\sin\theta$ and $\cos\theta$.
11. Determine the missing measure using exact values:

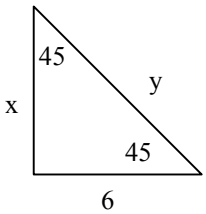
a)



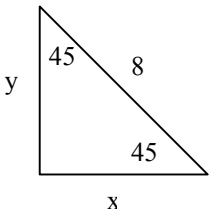
b)



c)

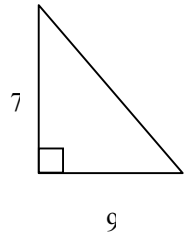


d)

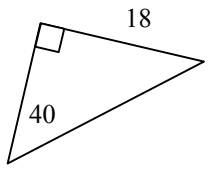


12. Determine the missing components of the right triangles:

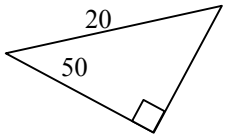
a)



b)



c)



13. a) A string on a kite makes an angle of elevation of 70 degrees with the ground. If the length of the string is 200m, how high is the kite above the ground.
    b) The angel of depression made by looking down from the top of a 30 m building to a point on the ground is 42 degrees. How far is the point from the base of the building?

Permutations and combinations

1. In how many ways can three letters from the word "simple" be arranged if no letter is to used more than once.
2. In how many ways can we group 3 magazines from a pile of 8 magazines:
3. In how many ways can 7 students be positioned for a class picture?
4. In how many ways can 3 Algebra, 2 English and 4 Science books be arranged on a shelf if the Science books must be on the left side of the shelf.
5. If five people attend a show and two state that they must sit together, in how many ways can these five individuals be seated in five adjacent seats?
6. How many four digit odd numbers can be formed using the digits 0, 2, 3, 5, 7, 8?
7. In how many ways can we arrange the letters from the word "inference"?
8. In how many ways can a committee of four be selected from 10 individuals?
9. In how many ways can I select 2 letters from the word "form" and three letters from the word "table"?
10. In how many ways can I select 2 letters from the word "form" and three letters from the word "table" and arrange them to form five letter words?
11. In how many ways can six people be seated at a table?
12. In how many ways can 6 people be seated at a table if two individuals wish to sit together?
13. In how many ways can nine different keys be arranged on a key ring.
14. In how many ways can 6 red, 5 yellow and 4 green beads be arranged on a necklace. The beads only differ in color.