Name: Solution key PID: _____

MATH 2: Midterm 1

Summer 2017

Instructions:

(1) Write your name and PID on the front of the exam.
(2) No calculators or other electronic devices are allowed during this exam.
(3) Read each question carefully, and answer each question completely.
(4) Show all of your work. No credit will be given for unsupported answers.

1	/10
2	/10
3	/10
4	/10
5	/10
Extra	/3
$\sum$	/50

Problem 1 (10 points) Simplify the following expressions as much as possible

a) $\dfrac{2^{-2}+3^{-1}}{3^2-2^3}$ $= \dfrac{\frac{1}{2^2}+\frac{1}{3}}{9-8} = \dfrac{\frac{1}{4}+\frac{1}{3}}{1}$

$= \frac{3}{12}+\frac{4}{12} = \boxed{\frac{7}{12}}$

b) $\dfrac{4^2 \cdot 2^{-3}}{2^{-1} \cdot 8}$ $= \dfrac{2^4 \cdot 2^{-3}}{2^{-1} \cdot 2^3}$

$= 2^4 \cdot 2^{-3} \cdot 2^1 \cdot 2^{-3}$

$= 2^{4-3+1-3}$

$= 2^{-1} = \boxed{\frac{1}{2}}$

c) $\left(\dfrac{16}{27}\right)^{3/2}$ $= \left(\sqrt{\frac{16}{27}}\right)^3$

$= \left(\frac{4}{3\sqrt{3}}\right)^3$

$= \dfrac{64}{27\sqrt{27}}$

$= \boxed{\dfrac{64}{81\sqrt{3}}}$

Problem 2 (10 points) Nordstrom is having a 30% sale store-wide. Sally went to the store and paid $21 for a dress (after discount).

a) What was the original price of the dress?

if x is the original price of the dress, then

$$\frac{70}{100} \cdot x = 21$$

$$x = \frac{21 \cdot 100}{70} = \boxed{30}$$

b) Sarah has a coupon, which gives 10% off the already discounted price of the dress. That is, the coupon applied to the sale price of $21, not the original price. How much does Sarah have to pay for the dress?

pay 90% of 21

$\Rightarrow$ pay $\frac{90}{100} \cdot 21 = \boxed{18.9}$

c) Two weeks later, Nordstrom is instead having a 40% sale store-wide. Sue goes to store and buys the same dress. How much does Sue have to pay for the dress?

pay 60% of the orlginal price.

$\Rightarrow$ pay $\frac{60}{100} \cdot 30 = \boxed{18}$

Problem 3 (10 points):

a) Solve for x:

$$(x-2y)(wx-\frac{3}{2}z)=0$$

$\Rightarrow$ $x-2y=0$ or $wx-\frac{3}{2}z=0$

$\boxed{x=2y}$

$wx=\frac{3z}{2}$

$\boxed{x=\frac{3z}{2w}}$

b) Solve for x:

$$x^2+10=6x$$

$$x^2-6x+10=0$$

use quadratic formula:

$$x=\frac{-(-6)\pm\sqrt{(-6)^2-4(1)(10)}}{2\cdot(1)}=\frac{6\pm\sqrt{36-40}}{2}$$

$$=\frac{6\pm\sqrt{-4}}{2}=\boxed{3\pm i}$$

c) Solve the following equation for x using the factorization method:

$$x^2+11x+24=0$$

$$(x+3)(x+8)=0$$

$\boxed{x=-3 \text{ or } x=-8}$

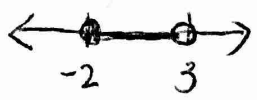
Problem 4 (10 points)

a) Represent the set of numbers using **interval notation** and **number line notation**:

$$-2 \leq x < 3$$

interval : $[-2, 3)$

number line



b) Represent the following interval using **inequalities** and **number line notation**:

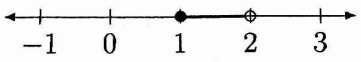
$$\left(-\infty, \frac{3}{2}\right]$$

inequality : $x \leq \frac{3}{2}$

number line :



c) Represent the following number line notation using **inequalities** and **interval notation**:

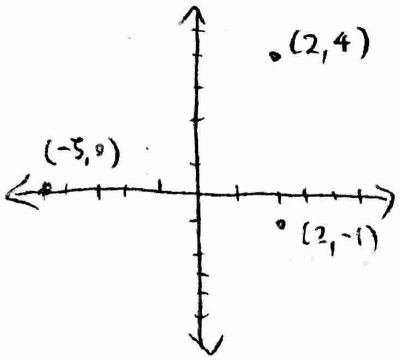


inequality : $1 \leq x < 2$

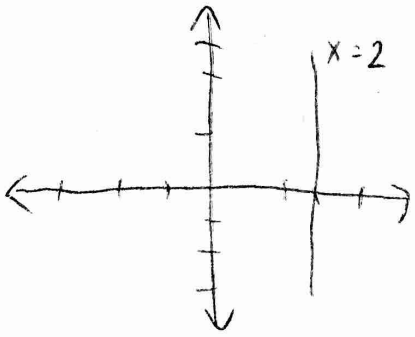
interval $[1, 2)$

Problem 5 (10 points)

a) Draw a coordinate plane, and label the points $(2,4), (-5,0)$ and $(2,-1)$ on the plane.



b) Draw a coordiate plane, and draw a graph of the equation $x = 2$.



c) True or false: The point $(1,4)$ is on the graph of the following equation:

$$3x^4 - \frac{3}{2}y + 3 = 0$$

(Hint: Do not draw the graph)

plug in $x = 1, y = 4$

$$3(1)^4 - \frac{3}{2}\cdot(4) + 3 = 3 - 6 + 3$$

$$= 0$$

the equation is satisfied

$\Rightarrow$ $(1,4)$ is on the graph of the equation

$3x^4 - \frac{3}{2}y + 3 = 0$ $\Rightarrow$ TRUE