Math1013 Calculus I **Name:** Kin Nam KOO

Homework-1 : Due 09/26/2021 at 11:59pm HKT

This is a set of homework questions to let you review some basic algebra and get familiar with the basic types of questions that WeBWorK can ask.

Give 4 or 5 significant digits for numerical answers. For most problems when entering numerical answers, you can if you wish enter elementary expressions such as 3^2 or 3**2 instead of 9, sin(3 * *pi*/2) instead of -1, *e*^(ln(3)) instead of 3, (1+tan(3)) * (4−sin(5))^6−15/8 instead of 12748.8657, etc. In other words, WeBWorK can compute the value of the expression you enter.

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1. (5 points) The expression

$$\left(\frac{5a^{-6}}{7b^{-1/5}}\right)^{-1}$$

equals na^r/b^t where
n, the coefficient, is: _____
r, the exponent of a, is: _____
t, the exponent of b, is: _____

(Hint: Take a look at the "Laws of Exponents" first if you are unsure how to proceed with this question.)

Correct Answers:

- 1.4
- 6
- 0.2

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2. (5 points) Simplify the expression

$$\frac{y^2+4y}{y^2-16}$$

and give your answer in the form of

$$\frac{f(y)}{g(y)}.$$

Your answer for the function $f(y)$ is : _____
Your answer for the function $g(y)$ is : _____

Correct Answers:

- y
- y-4

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3. (5 points) Simplify the expression

$$\frac{5x}{(x+1)^2}+\frac{1}{x+1}$$

and give your answer in the form of

$$\frac{f(x)}{g(x)}.$$

Your answer for the function $f(x)$ is : _____
Your answer for the function $g(x)$ is : _____

Correct Answers:

- (5+1)*x+1*1
- (x+1)*(x+1)

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4. (5 points) Consider the line graphs of the following two linear functions,

$$y=f(x)=-6x+9 \quad y=g(x)=-5x+1$$

a) Which line has a greater slope?

- A. f(x) has greater slope.
- B. g(x) has greater slope.
- C. Their slopes are equal.

b) Which line has a greater y -intercept?

- A. f(x) has a greater y -intercept.
- B. g(x) has a greater y -intercept.
- C. Their y -intercepts are equal.

Solution:

SOLUTION
a) The slope of *f(x)* is -6, and the slope of *g(x)* is -5 . Since $-5>-6$, the slope of *g(x)* is greater than the slope of *f(x)* (it is less negative).

b) The y -intercept of *f(x)* is 9, and the y -intercept of *g(x)* is 1. Since $9>1$, the y -intercept of *f(x)* is greater than the y -intercept of *g(x)* .

Correct Answers:

- B
- A

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5. (5 points) You bought a new car for $23,500 in 2005, and the value of the car depreciates by $500 each year. Find a formula for V , the value of the car, in terms of t , the number of years since 2005.

$V(t)=$ _____
(Be sure NOT TO USE ANY COMMAS when you enter your formula. For example enter two thousand as 2000 and not as 2,000.)

Solution:

SOLUTION
They y -intercept is 23500 since the initial value of the car when you purchased it (i.e. when t = 0) was 23,500. The slope is -500 since the value goes down by $500 for every increase in t by 1. Plugging these values into the general formula for a line y = mx + b yields the formula
$V(t)=23500-500t$.

Correct Answers:

- `23500 - 500 * t`

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6. (5 points) Solve the equation $x^2 - 3x - 28 = 0$ by factoring.

The solutions are $x_1 =$ _____ and $x_2 =$ _____ with $x_1 \leq x_2$.

Correct Answers:

- `-4`
- `7`

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7. (5 points) By completing the square, the expression $x^2 - 12x + 138$ equals $(x+A)^2 + B$
where $A =$ _____ and $B =$ _____

Correct Answers:

- `-6`
- `102`

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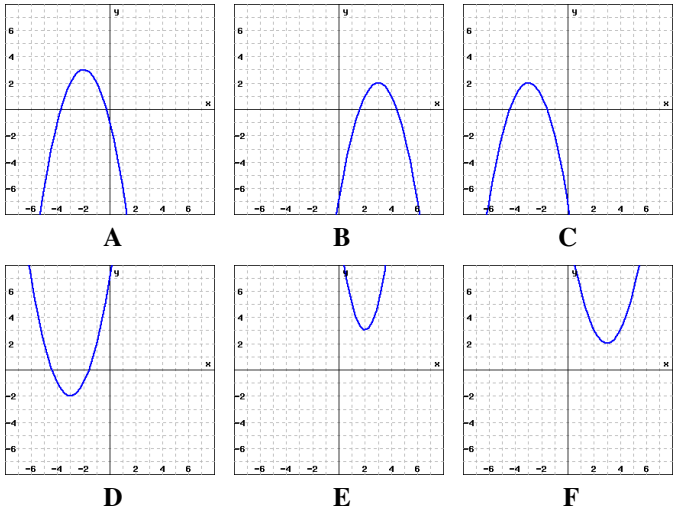
8. (5 points)

Match each graph with its corresponding equation.

[?] 1. $-(x-3)^2+2$
[?] 2. $(x-3)^2+2$
[?] 3. $-(x+2)^2+3$
[?] 4. $-(x+3)^2+2$



A **B** **C**

D **E** **F**

(Click on a graph to enlarge it)

Correct Answers:

- `B`
- `F`
- `A`
- `C`

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9. (5 points) Phyllis invested 37000 dollars, a portion earning a simple interest rate of 5 percent per year and the rest earning a rate of 6 percent per year. After one year the total interest earned on these investments was 1970 dollars. How much money did she invest at each rate?

At rate 5 percent : _____
At rate 6 percent : _____

Correct Answers:

- `25000`
- `12000`

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10. (5 points) In this problem the two speeds are different and unknown.

You and your friend part at an intersection. You drive off north at a constant speed, and your friend drives east at a speed that is 10 mph higher. After 4 hours the distance between you and your friend is 334.95 miles. You have been driving at _____ mph. (Round to the nearest mile).

Solution:

Solution: Let v be your speed. In 4 hours you travel a distance of $4v$ miles. During the same time, your friend travels a distance of $4(v+10)$ miles. By the Pythagorean Theorem the distance between you and your friend after 4 hours equals

$$\sqrt{(4v)^2 + (4(v+10))^2} = 334.95 \text{ miles.}$$

This quadratic equation can be solved by squaring on both sides, to get rid of the square root, and then simplifying and completing the square. The answer is

$$v = 54 \text{ miles.}$$

That's your speed.

Correct Answers:

- `54`

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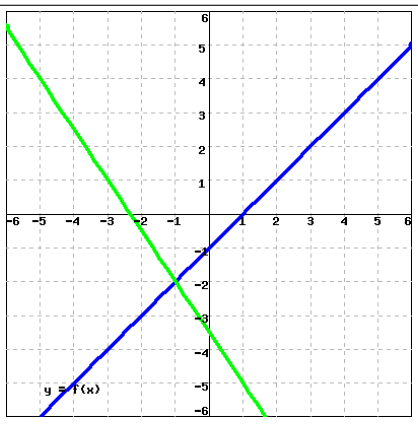
11. (5 points)



The graphs of two linear equations are shown above. The graph of $y = f(x)$ is in blue and the graph of $y = g(x)$ is in green. Find the interval where $f(x) \geq g(x)$.

Answer: _____

Correct Answers:

- `x >= -1`

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12. (6 points) Solve:

$$\frac{(x-4)}{6} \geq \frac{(x-1)}{12} + \frac{5}{24}$$

Answer: _____

Correct Answers:

- `[19/2,infinity)`

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13. (7 points) For a certain county, the percentage, P, of voters who used electronic voting systems, such as optical scans, in national elections can be modeled by the formula

$$P = 2.9x + 13.4,$$

where x is the number of years after 2001. In which years will more than 45.3% of the county's voters use electronic systems? Note: Enter your answer as, *Voting years after yyyy* – do not put a period at the end of the phrase.

Answer: _____

Correct Answers:

- `VOTING YEARS AFTER 2012`

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14. (5 points) Solve: $|2t-4|+1=1$

Answer: _____

Correct Answers:

- `t = 2`

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15. (7 points) Solve: $\left|\frac{3x+3}{3}\right| \leq 3$

Answer: _____

Correct Answers:

- `-4 <= x <= 2`