Pre-Calculus Summer Assignment

Solve the following equations. Show your steps!!

1. $\quad 7-(4x-3)=2(x+4)$	2. $\quad 4x-2(5x-3)=3(x-1)+7x$
3. $\quad \dfrac{x+1}{3}+\dfrac{x+2}{7}=5$	4. $\quad \dfrac{2x+1}{3}+16=3x$
5. $\quad \dfrac{2x}{x+3}-1=\dfrac{x}{x-2}$	6. $\quad \dfrac{2}{x+2}-\dfrac{3}{x-1}=\dfrac{-2}{3}$
7. $\quad (x+7)(x-1)=(x+1)^2$	8. $\quad 3x^2=4x+4$
9. $\quad 5x^2-6=-13x$	10. $\quad x^3+2x^2-9x-18=0$
11. $\quad \sqrt{x-2}=3\sqrt{x+2}$	12. $\quad \sqrt{3x-2}=x-2$

Find an equation for the line with the given properties.
Express your answer in slope/intercept form $y = mx + b$

13. Slope = 2; containing the point $(4,-3)$	14. Slope $= -\dfrac{2}{3}$; containing the point $(1,-1)$
15. Containing the points $(-3,4)$ and $(2,5)$	16. x-intercept = 2; y-intercept = -1
17. Horizontal; containing the point $(-3,2)$	18. Vertical; containing the point $(4,-5)$

19. Parallel to the line $y = -3x + 2$;
    containing the point $(-1,2)$
	20. Parallel to the line $2x - 3y = -4$;
	    containing the point $(-5,3)$

21. Perpendicular to the line $y = 2x - 3$;
    containing the point $(1,-2)$
	22. Perpendicular to the line $3x - y = -4$;
	    containing the point $(-2,4)$

Find the following values for each function.

1. $f(x) = -2x^2 + x - 1$ a) $f(0) =$ b) $f(-1) =$ c) $f(-x) =$ d) $-f(x) =$ e) $f(x+1) =$	2. $f(x) = \dfrac{x^2 - 1}{x + 4}$ a) $f(0) =$ b) $f(-1) =$ c) $f(-x) =$ d) $-f(x) =$ e) $f(x+1) =$

f) $f(2x) =$	f) $f(2x) =$

Find the domain and range of each function.

3. $f(x) = 2^x + 3$	4. $f(x) = \log_{10}(x-3)$	5. $f(x) = \sqrt{3x - 12}$

Find the following values for the given functions.

6. $f(x) = 2x^2 + 3$ and $g(x) = 4x^3 + 1$	7. $f(x) = 1 + \dfrac{1}{x}$ and $g(x) = \dfrac{1}{x}$
a) $(f+g)(x) =$	a) $(f+g)(x) =$
b) $(f-g)(x) =$	b) $(f-g)(x) =$
c) $(f \cdot g)(x) =$	c) $(f \cdot g)(x) =$
d) $(f+g)(3) =$	d) $(f+g)(3) =$
e) $(f-g)(-4) =$	e) $(f-g)(-4) =$

Find the difference quotient using the equation $\dfrac{f(x+h) - f(x)}{h}$ $h \neq 0$. (example below)

Example: $f(x) = x^2 - x + 4$

$$f(x+h) = (x+h)^2 - (x+h) + 4$$
$$= x^2 + 2xh + h^2 - x - h + 4$$

Therefore, $\dfrac{f(x+h) - f(x)}{h} = \dfrac{x^2 + 2xh + h^2 - x - h + 4 - (x^2 - x + 4)}{h}$

$$= \dfrac{2xh + h^2 - h}{h} = 2x + h - 1$$

The answer is $2x + h - 1$

8. $f(x) = -3x + 1$

9. $f(x) = x^2 + 5x - 1$

10. $f(x) = 4x^2 + 5x - 7$

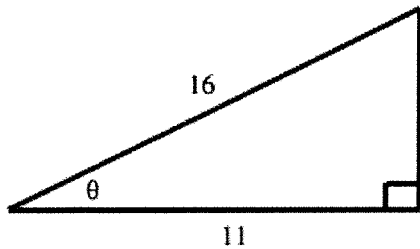31. Evaluate the 3 trigonometric functions (sin, cos, tan) for the angle.

A. $\theta = °\ 120$

B. $\theta = 7\ \pi/6$

C. $\theta = -\ 13\ \pi/4$

Evaluate $\cos\dfrac{\pi}{3} + \tan\dfrac{2\pi}{3} + \sin\dfrac{5\pi}{6}$.   (Hint use the special right triangle for each angle)

. Find the exact values of the six trigonometric functions of the angle θ.

Given the point (5, -7) on the terminal side of an angle, determine the three trig functions. Verify the Pythagorean theorem.

35. Given $\sin \theta = 3/4$ and $\cos\theta < 0$ evaluate $\tan\theta$ and $\sin\theta$. Verify the Pythagorean theorem.

Given $\tan\theta = 7/2$ and $\sin\theta < 0$, evaluate $\sin\theta$ and $\cos\theta$. Verify the Pythagorean theorem.

Complete the table.

Radian Measure	$\dfrac{11\pi}{3}$		$\dfrac{5\pi}{4}$		$\dfrac{19\pi}{6}$		3π	
Degree Measure		$330°$		$450°$		$-45°$		$-210°$
$\sin\theta$								
$\cos\theta$								

Complete the table.

	a	b	Amplitude	Period	DOMAIN	RANGE
38. $f(x) = -0.35\sin 4x$						
39. $f(x) = 2\cos x$						
40. $f(x) = -3\sin \dfrac{2}{5}x$						
41. $f(x) = 5\tan 4x$						

Graph each of the functions from the table above.

Ryan has a savings account that pays 4.5% interest annually compounded quarterly. She has not made any deposits or withdrawals for many years. Suppose that her current balance is $4,516.32. How much money was in her account 5 years ago?

Beth owns a painting whose value has been growing exponentially. In the 6 years she's owned the painting its value has grown from $20,000 to $30,000. By what hundredth of a percent did the painting's value grow each year?

Steve owns a classic car whose value has been increasing by 8.5% each year. The car is worth $5000. He wants to sell the car when it is worth $10,000. How many years to the nearest hundredth must he wait?

Convert the following angle measures from degrees to radians or radians to degrees.

A. $\theta = 7/5\,\pi$ B. $\theta = 310°$

A person standing 100 meters from the base of a vertical tower places a transit on the ground and determines the angle of elevation to the top of the tower is 41.° Determine the height of the tower.

A building has a row of lights around the sides of the building 30 feet below the top of the building. A marker on the street that approaches the building notes that the angle of elevation to the top of the building is 10° and the angle of elevation to the row of lights is 6°. How far from the building is the marker on the street and how tall is the building?

1. Write an exponential function to model each situation. Find the value of each function after five years.
   a) A $12, 500 car depreciates 9% each year.

   b) A baseball card bought for $50 increases 3% each year.

2. A cab driver charges $3.25 for the first mile and $1.3 for each additional mile. How much will cost you if you have to travel 25 miles?

3. A new car that sells for $18, 000 depreciates 25% each year. Write a function that models the value of the car. Find the value of the car after 4years.

4. The bear population increases at a rate of 2% per year. There are 1573 bears this year (2013). Write a function that models the bear population. How many bears will be there in 2018?

5. A balloon of 20m^3 of air is rises and as it rises its volume is halved every hour. What is its volume after rising 2.5 hours?

6. A bacteria population doubles every minute. If initially there are two cells of this bacterium, how many cells will be after half an hour?

7. Lin is tracking the progress of her plant's growth. Today the plant is 5 cm high. The plant grows 1.5 cm per day.
   a. Write a model that represents the height of the plant after d days.
   b. What will the height of the plant be after 20 days?

8. A salesperson receives a base salary of $35,000 and a commission of 10% of the total sales for the year.
   a. Write a linear model that shows the salesperson's total income based on total sales of k dollars.
   b. If the salesperson sells $250,000 worth of merchandise, what is her total income for the year, including her base salary?

Divide using long division.

5. $(x^3 - 8x^2 + 17x - 10) \div (x - 5)$

6. $(x^3 + 5x^2 - x - 9) \div (x + 2)$

7. $(-2x^3 + 15x^2 - 22x - 15) \div (x - 3)$

8. $(x^3 + 7x^2 + 15x + 9) \div (x + 1)$

9. $(x^3 + 2x^2 + 5x + 12) \div (x + 3)$

10. $(x^3 - 5x^2 - 7x + 25) \div (x - 5)$

11. $(x^4 - x^3 + x^2 - x + 1) \div (x - 1)$

a) $(7x^2 + 8x - 5) - (9x^2 - 9x)$

Standard form   Classify by number of terms   Sketch the end behavior

b) $(x - 2)^3$

Standard form   Classify by degree   Sketch the end behavior

c) $(x2 + 1)^2 - (-2x^2 - 3)$

Standard form   Classify by number of terms   Sketch the end behavior

d) $(3a^2 - a - 7) + (5a^2 + a + 8) - (-2a^2 + 3a - 9)$

Standard form   Classify by degree   Sketch the end behavior

e) $x(2x)(4x + 1)$

Standard form   Classify by number of terms   Sketch the end behavior