1. (4 points) Simplify

$$\frac{(3-2x)^4(x+5)4x + (3-2x)^3 3(x+5)^2}{(3-2x)^7}$$

2. (4 points) Write down all the possible rational solution of $P(x) = 2x^3 + 2x^2 - 24$, Use Descrates Rules to determine how many positive and negative solution does it have?

3. (3 points) Check that whether x+2 is the factor of the polynomial $P(x) = x^3 + 2x^2 - 7$, why or why not give a reason. Use the remainder theorem to compute the remainder.

4. (4 points) Consider the function $f(x) = 3x - 2$ then find

$$\frac{f(x+h) - f(x)}{h}$$

.

5. (3 points) Find the quotient and remainder by using the Synthetic division for

$$\frac{x^5 + 3x^3 - 6}{x - 1}$$

6. (4 points) Find the domain of $f^{-1}(x)$ for the function

$$f(x) = -2x + 4$$
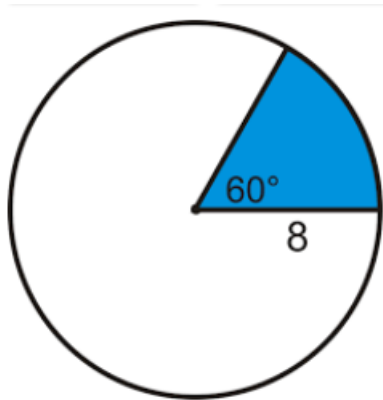
.

7. (3 points) Solve the equation

$$e^{2x} - 3e^x + 2 = 0$$

8. (3 points) Solve the equation

$$log(x) + log(x - 1) = log(4x)$$

9. (4 points) Find the reference angle and 3 coterminal angles (with at least one negative) for $210°$.

10. (3 points) Find the area of colored sector for the given figure.

11. (5 points) Find the value of the following

(a) (2 points) $cos(\frac{\pi}{6})$

(b) (2 points) $cot(-\frac{\pi}{3})$

(c) (2 points) $sin(\frac{5\pi}{4})$.

(d) (2 points) $cot(120°)$

(e) (2 points) $tan(-60°)$

12. (6 points) A certain species of bird was introduced in a certain county 25 years ago. Biologist observer that the population doubles every 10 years, and now the population is 13,000.

   (a) What was the initial size of the bird population?

   (b) Estimate the bird population 5 years from now.

13. (5 points) Draw the graph by making the table of $f(x) = cos^{-1}(x)$. Also, State its domain and range.

14. (5 points) Graph the one period of $y = 3tan(x - \frac{\pi}{4})$

15. (4 points) From the top of the 200-ft lighthouse, the angle of depression to a ship in the ocean is 30°. How far is the ship from the base of lighthouse?

16. (4 points) Find the measure of all angles $\angle A, \angle B$ and, $\angle C$ for the following graph.
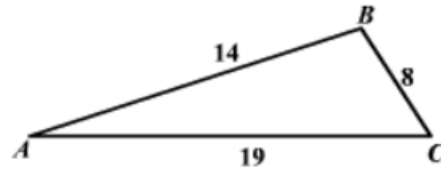
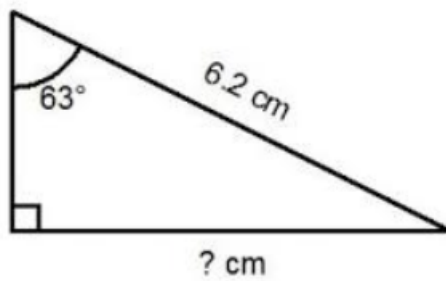17. (6 points) Find the domain, vertical Asymptotes, Horizontal and Oblique (slant) Asymptotes (if exit), x-intercept, y-intercept of

$$f(x) = \frac{\sqrt{x-2}}{x-4}$$

18. (4 points) Write down $tan(\theta)$ in terms of $cos(\theta)$ in the II quadrant.

19. (4 points) Find the all angle and sides.

20. (4 points) Given

$$f(x) = 3x - 2 \quad \text{and} \quad g(x) = \frac{3}{2x - 3}$$

then find i) $(f \circ g)(x)$, and its domain

21. (4 points) Is the following sequences Arithmetic, Geometric or Neither? Find Arithmetic find the common difference d and if it is Geometric find the common ration$r$.

(a) (1 point) 7,3,-1,-5,-9,...

(b) (1 point) 2,3,5,8,19,27,...

(c) (1 point) 2,8,32,128,...

(d) (1 point) $8,-4,2,-1,\frac{1}{2},...$

22. (4 points) Determine whether following infinite geometric series is convergent or divergent. if it converges, find its sum

$$1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + ...$$

23. (4 points) Determine the nth term and partial sum of 20 terms of the series

$$1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + ...$$

24. (4 points) Determine the nth term and 20th terms of the sequence

$$11, 17, 23, 29, ...$$

25. (2 points) Find the binomial expansion of $(2x + 1)^4$.

bonusbonusbonus

26. (5 bonus points) Graph the following function

$$f(x) = 3^{x-3} - 2$$