TURN OFF YOUR CELL PHONE AND PUT IN BAG. IF YOUR CELL PHONE IS SEEN, YOU WILL EARN A "0". SHOW ALL WORK CLEARLY FOR CREDIT. SCIENTIFIC CALCULATOR ONLY!!

[12] 1. Fill in the chart with EXACT values. Also include the radian measure.

	x = 30^0 or _____ radians	x = 45^0 or _____ radians	x= 60^0 or _____ radians
sin(x)			
cos(x)			
tan(x)			

[12] 2. Solve each equation on the interval $0 \le \theta < 2\pi$. Use exact values (no calculators/decimals)

a) $\sin(\theta) - \sin(\theta)\tan(\theta) = 0$

b) $2\sin^2\theta + 3\sin\theta = -1$

[7] 3.   Find **all** solutions (the general solution) to $\cos(3\theta) = \frac{\sqrt{3}}{2}$.

[30] 4.   Give exact answers and show work algebraically. **Do not use decimals**. 0 points for guess and check, you must use proper algebra.

a) $\sqrt{7x + 5} + 3 = x$

b) $e^{2x} - 2e^x - 8 = 0$

c) $2\ln(2 + 7x) = 6$

d) $2x^2 - 5x - 3 \geq 0$. Use interval notation for solution.

e) $\frac{1}{x} + \frac{1}{x-3} = \frac{x-2}{x-3}$

[12]5.   Suppose $\sin(\theta) = -\frac{1}{3}$ where θ is in Quadrant III. Find the following. Give exact values (no decimals)

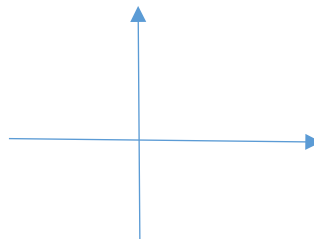a) $\cos\theta$ b) $\sin(2\theta)$ c) $-6sin^2\theta$

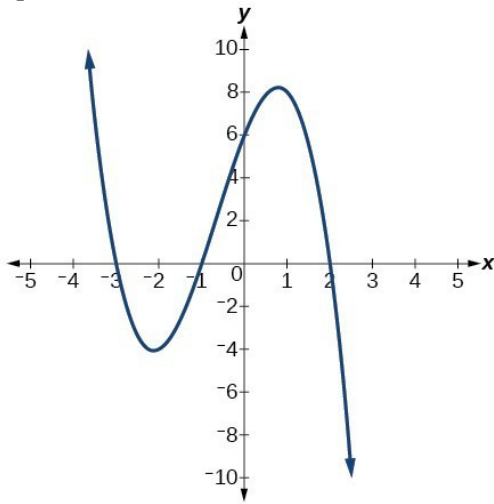[10] 6. Find the domain (use interval notation)

a) $f(x) = \sqrt{3+x}$ b) $g(x) = \sin(x)$

[5] 7.   Graph a function that has the following characteristics:

Vertical asymptote at x = 2, Horizontal Asymptote at y= -1. x-intercept at (3,0) and y-intercept at (0, -3/2) and has a domain of all real numbers except x=2.

8.   Use the graph of y=f(x) to answer the following:
[12]

a)   Estimate the interval(s) on which f(x) is decreasing

b)   Give the coordinates (x,y) of the relative extrema and classify as maximum or minimum

c)   Is the leading coefficient of the polynomial f(x) negative or positive?

d)   Is the degree of the polynomial of f(x) even or odd? Explain.

e)   State the zeros and whether the multiplicity is even or odd for each zero (root).
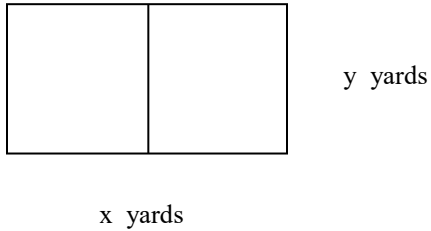
f)   Give the domain in interval notation.

[12] 9a. Graph at least one period. **Clearly label** each graph pointing out x-intercepts and maximum and minimum points. Label axes.
$$y=-3\cos(2x)$$
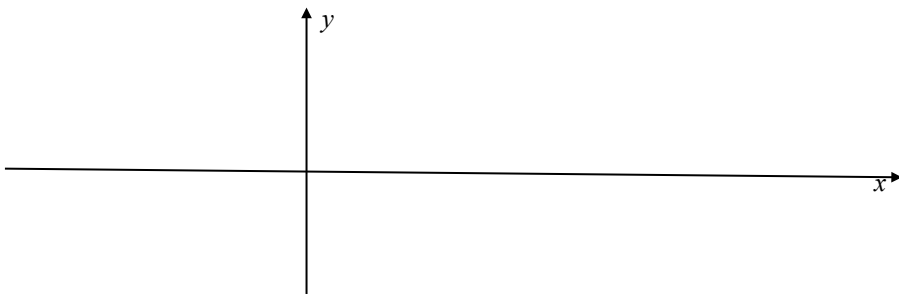
9b. Given $f(x) = -4\cos(5\pi x - 2)$ state the information:

a) Period: b) amplitude: c) Phase shift.

[6] 10. Two rectangular corrals are enclosed with 80 yards of fence. Find the area of the corral in terms of y only.

y yards

x yards

[6]   11. In 2010, the population of Stamperville was 4,025 people. If the population growth rate is 1.6%, find the number of years it takes for the population to grow to 4500, assuming exponential growth, $P = P_0 e^{kt}$. You can keep your answer in exact form (with units) or round to 2 decimal places.

[10]   12. Find all solutions in simplified form, both real and complex imaginary.

a) $x^2 - 2x = -6$

b) $x^4 - 16 = 0$

[12] 13. Consider $f(x) = \frac{x^2 + x - 6}{x^2 + 2x - 3}$

a) State the domain of f(x)

d) Find the zero(s)

b) Find the y-intercept

e) Find the horizontal asymptote (or state none)

c) Find the vertical asymptote (or state none)

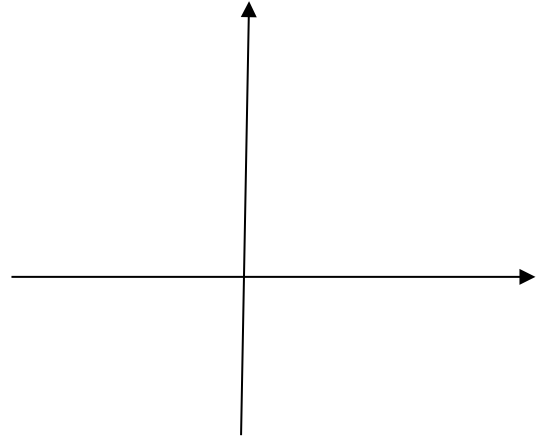f) Find the x and y-coordinates any holes (or state none).

[10] 14.   Graph $f(x) = -x^4 - 2x^3 + 15x^2$

   a) Give the y-intercept   b) give factored form

   c) Zeros | Multiplicity | Tangent or cross through?

   d) Draw the end behavior: e) Graph. Label all intercepts!
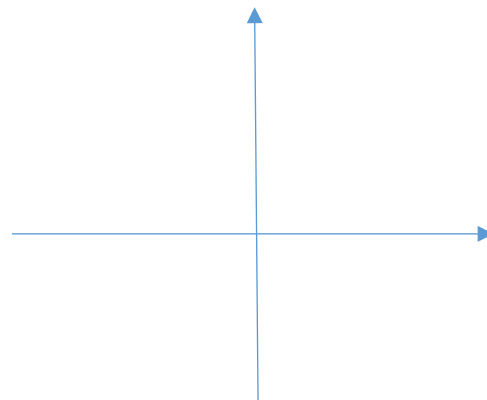   You don't need to label y-axis.

[6]   15. If $g(x) = 2x^2 - 4x$, $find$:

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

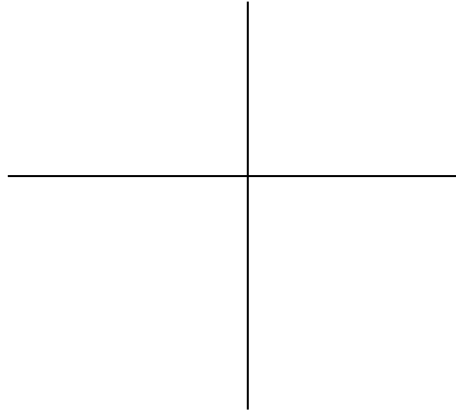[6] 16. Graph the following. Mark the endpoints as opened or closed.

$$f(x) = \begin{cases} 2x - 3, & x \geq -1 \\ 4, & x < 1 \end{cases}$$

[18] 17. Graph. **DASH** in asymptotes where appropriate. Fill in information.

    a) $y = x^2 - 6x - 7$

Label vertex, zeros and intercept
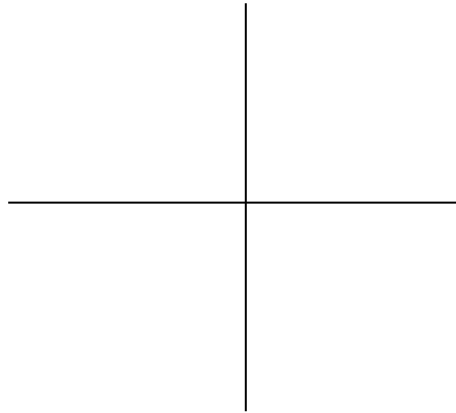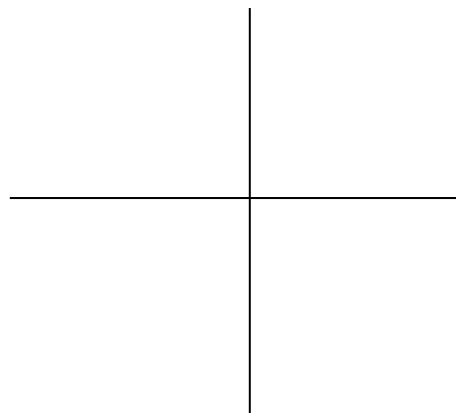on graph

Vertex:

Zeros:

y-intercept:

b) $y = -e^x + 2$

Equation of asymptote:

y-intercept:

c) $f(x) = \ln(x - 3)$

Equation of asymptote:

x-intercept:

[14] 18. Prove **any 2** of the following 3. **Check the two boxes of the problems you want graded.**   Put reasons next to each step. If you don't check two boxes, the first two will be graded, regardless of work.

a) $tan^2x - sin^2x = tan^2x \cdot sin^2x$

Grade?

b) $sin\left(\dfrac{\pi}{2} - x\right) = \cos x$

Grade?

c) $\dfrac{1}{1 - \sin x} = \sec^2 x + \tan x \sec x$

Grade?