1. Solve the following inequalities and express your answers in interval notation.
   a. $|2x - 7| \leq 11$
   b. $|2x - 7| > -5$
   c. $x^2 - 3x \leq -2$.

2. Find the domain and range of the following functions. Graph each function.
   a. $f(x) = |2x - 1| + 2$
   b. $g(x) = \sqrt{6 - 3x}$
   c. $h(x) = -\sqrt{x - 4}$
   d. $m(x) = e^{-x^2 + 2}$
   e. $k(x) = 2 + \ln(x + 1)$
   f. $t(x) = \left(\sqrt{x}\right)^2$

3. a. Find the equation of a line through $(2, 3)$ and parallel to $3x - 2y = 7$.
   b. Find the equation of a line through $(2, 3)$ and perpendicular to $3x - 2y = 7$.

4. Find the equation of the perpendicular bisector of the line segment joining $(-3, 5)$ and $(5, -7)$.

5. Find the center and radius of the following circle and sketch: $x^2 - 2x + y^2 = 0$.

6. Identify the graphs below:
   a. $(x - 2)^2 + (y + 5)^2 = -1$
   b. $(x - 2)^2 + (y + 5)^2 = 0$
   c. $(x - 2)^2 + (y + 5)^2 = x^2 + y^2$

7. Let $f(x) = 2 + \sqrt{x}$ and $g(x) = x^2$.
   Evaluate the following expressions:
   a. $f(9)$
   b. $f(4 - x)$
   c. $f\left(g\left(x\right)\right)$
   d. $\frac{g(x + h) - g(x)}{h}$

8. a. Find a cubic polynomial $p(x)$ with roots of -1, 0, and 5 and $p(2) = 9$. Express your answer as a product of linear factors.
   b. Find a polynomial $p(x)$ of degree 3 with real coefficients satisfying the condition $p(-1) = 5$ and whose roots include 0 and $2 - 3i$.
   c. Find a polynomial $p(x)$ of degree 3 with real coefficients satisfying the condition $p(-1) = 5$ and whose roots include 1 and $-3i$. 


9. Find the exact roots of the polynomials below:
   a. \(2x^3 - x^2 - 3x - 1\)  
   b. \(2x^3 - x^2 + 8x - 4\)

10. Sketch complete graphs and indicate the viewing windows.
   a. \(y = x^2 (x-1)^3\)  
   b. \(y = x^2 (x-2) (x-3)^3\)

   Notes: It is the intention that students experiment with these graphs using their graphing calculators to see that the graph of a polynomial is tangent to the x-axis at a real zero of multiplicity greater than 1 and crosses the x-axis at a real zero whose multiplicity is odd.

11. a. Let \(v = (5\sqrt{3}, -5)\), find the magnitude and direction of \(v\).
   b. If a vector has magnitude 150 and direction angle 155°, find its horizontal and vertical components.

12. a. Rewrite \(1 + i\) in polar form
   b. Use your result in part (a) and DeMoivre's Theorem to write \((1+i)^5\) in the form \(a + bi\)

13. Find the following roots. Write your answers in standard form.
   a. Cube roots of \(-27i\)  
   b. Fourth roots of 1  
   c. Fourth roots of \(-8-8\sqrt{3}i\)

14. Let \(p = 2(\cos 90^0 + i \sin 90^0)\) and \(q = 5(\cos 120^0 + i \sin 120^0)\).
   Write the following in standard form:  
   a. \(\frac{p}{q}\)  
   b. \(pq\)

15. For the functions below, find the amplitude, period, any vertical translation and phase shifts. Draw the graphs over one period.
   a. \(y = 3 \cos (2x)\)  
   b. \(y = 1 + 2 \cos (3x)\)  
   c. \(y = \sin (2x/3)\)  
   d. \(y = -3 \sin \left(2x - \frac{\pi}{3}\right)\)
16. State the rule of the function of the form \( f(t) = A\sin(bt + c) \) or \( g(t) = A\cos(bt + c) \) whose graph appears to be identical to the graph below.

17. Identify the conic sections and draw the graphs of the equations.
   a. \( x^2 + 4y^2 - 6x - 8y + 9 = 0 \)
   b. \( y^2 - 6y - 8x + 1 = 0 \)
   c. \( 4x^2 - 9y^2 + 16x + 18y - 29 = 0 \)

18. Using the Binomial theorem, write in simplest form:
   a. The first four terms of the expansion of \((2x - y/2)^8\).
   b. The 7th term in the expansion of \((2x - y/2)^8\).

19. a. Find the sum of the first 65 terms in the arithmetic sequence below:
   \(-6, -2, 2, 6, 10, \ldots\)
   b. Find the sum of the infinite geometric sequence:
   \(24, -12, 6, -3, \ldots\)

20. The initial population of a colony is 10,000 and is decreasing exponentially at 1.5% per year.
   a. What is the size of the colony in 5 years?
   b. How long will it take for the population to be half of its initial amount?

21. The assets in the social security trust fund can be approximated by
   \[ f(t) = -0.013t^4 + 0.31t^3 + 2.19t^2 + 63.9t + 507, \] where \( f(t) \) is measured in millions of dollars and \( t = 0 \) corresponds to the beginning of 1995.
   a. Sketch \( f(t) \).
   b. In what year will social security go bankrupt?
   c. When will the social security system start to pay out more than it gets in payroll?
1. a. \([-2,9]\)  
   b. \((-\infty,\infty)\)  
   c. \([1,2]\)

2. a. domain: \((-\infty,\infty)\), Range: \([2,\infty)\)  
   b. domain: \((-\infty,2)\), Range: \([0,\infty)\)

   c. domain: \((4,\infty)\), Range: \((-\infty,\infty)\)  
   d. domain: \((-\infty,\infty)\), Range: \((0,\infty)\)

   e. domain: \((-1,\infty)\), Range: \((-\infty,\infty)\)  
   f. domain: \([0,\infty)\), Range: \([0,\infty)\)

3. a. \(2y - 3x = 12\)  
   b. \(3y + 2x = 5\)

4. \(3y - 2x = -5\)

5. \((x-1)^2 + y^2 = 1\), center \((1,0)\) and radius \(= 1\).

6. a. \(\emptyset\)  
   b. \((2,-5)\)
   c. \(10y - 4x + 29 = 0\)

7. a. 5  
   b. \(2 + \sqrt{4 - x}\)  
   c. \(2 + |x|\)  
   d. \(2x + h\)

8. a. \(p(x) = -\frac{1}{2}x(x+1)(x-5)\)  
   b. \(p(x) = -\frac{5}{18}x^3 + \frac{10}{9}x^2 - \frac{65}{18}\)  
   c. \(p(x) = -\frac{1}{4}x^3 + \frac{1}{4}x^2 - \frac{9}{4}x + \frac{9}{4}\)

9. a. \(x = -\frac{1}{2}, \; x = \frac{1 \pm \sqrt{5}}{2}\)  
   b. \(x = \frac{1}{2}, \; x = \pm 2i\)
10. 

\[ a. \quad -1 \quad -0.5 \quad 0.5 \quad 1 \quad 1.5 \]

\[ -0.08 \quad -0.06 \quad -0.04 \quad -0.02 \quad 0.02 \quad 0.04 \]

\[ 10. \quad a. \quad b. \]

11. a. \(|v| = 10, \quad \theta = 330^\circ\)
   b. \((-135.95, 63.39)\)

12. a. \(\sqrt{2}\left[\cos \left(\frac{\pi}{4}\right) + i \sin \left(\frac{\pi}{4}\right)\right]\)
   b. \(-4 - 4i\)

13. a. \(w_1 = 3i, \quad w_2 = -\frac{3\sqrt{3}}{2} - \frac{3}{2}i\) and \(w_3 = \frac{3\sqrt{3}}{2} - \frac{3}{2}i\)
   b. \(w_1 = 1, \quad w_2 = i, \quad w_3 = -1\) and \(w_4 = -i\).
   c. \(w_1 = \sqrt{3} - i, \quad w_2 = -\sqrt{3} + i, \quad w_3 = 1 + \sqrt{3}i\) and \(w_4 = -1 - \sqrt{3}i\)

14. a. \(\frac{\sqrt{3}}{5} - \frac{1}{5}i\)
   b. \(-5\sqrt{3} - 5i\)

15. a. \(A = 3, T = \pi, \phi = 0\)
   b. \(A = 2, T = 2\pi / 3, \phi = 0\)
   c. \(A = 1, T = 3\pi, \phi = 0\)
   d. \(A = 3, T = \pi, \phi = \pi / 6\)

16. \(f(t) = 7\cos \left(\frac{5\pi}{4}t\right)\) or \(f(t) = 7\sin \left(\frac{5\pi}{4}t + \frac{\pi}{2}\right)\)

17. a. Center: \((3,1), \quad a = 2, b = 1\)
   b. Vertex: \((-1,3), \quad p = 2, \quad focus = (1,3)\)
c. Center: \((-2,1)\), \(a = \pm 3, b = \pm 2, c = \pm \sqrt{13}\)

18. a. \(256x^8 - 512x^7y + 448x^6y^2 - 224x^5y^3 + \ldots\)
   b. \(\frac{7}{4} x^2 y^6\)

19. a. 7930   b. 16
20. a. 9272  b. 45.9 years.

21. a.

b. The year 2029

c. The year 2018