1. Given the points $A = (2, 8)$ and $B = (10, 14)$,

   (a) (5pt) Determine the midpoint C.

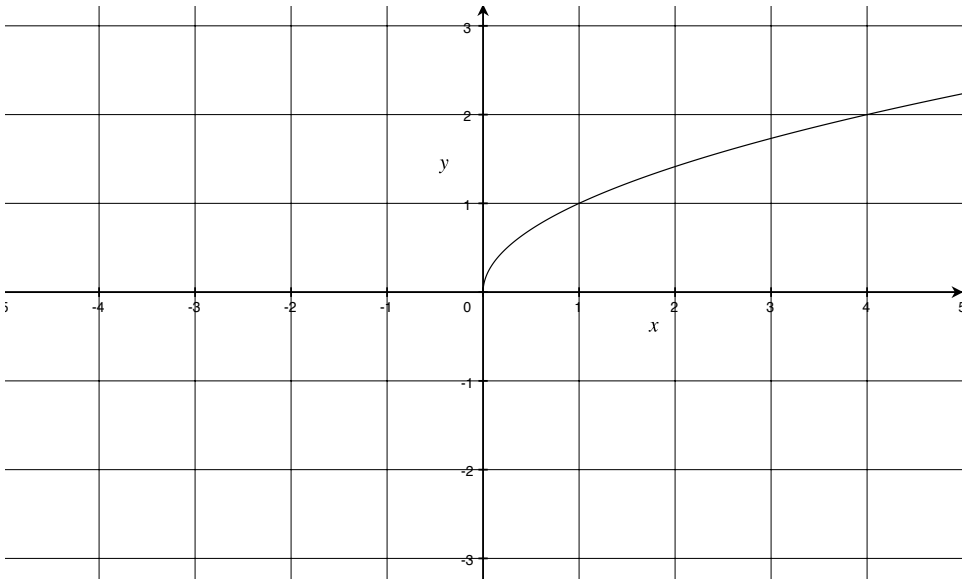
   (b) (10pt) If the line segment connecting A and B is the diameter of a circle, determine the equation of the circle.

   (c) (5pt) Determine the equation of line having points A and B.

   (d) (5pt) Determine the equation of the line perpendicular to the diameter AB which passes through the center of the circle.

2. (10pt) For the function $f(x) = x^2 + 2x - 3$, construct and simplify the difference quotient $\dfrac{f(2+h) - f(2)}{h}$.

3. (10 pt) The graph of $f(x) = \sqrt{x}$ is shown. On the same axis given, use transformations to sketch the graph of $g(x) = 1 - \sqrt{x+3}$



4. (10pt) Using the Rational Root Theorem, list all possible rational solutions to the equation $2x^3 + 3x^2 - 11x - 6 = 0$, then find the actual solutions.

5. (5pt) Determine the polynomial function $f(x)$ of degree 4 with $x = -2$ and $x = 3$ zeros of multiplicity one and having $x = 1$ as a zero of multiplicity 2, such that $f(0) = \frac{1}{2}$.

6. (5pt each) Write in the form $a + bi$

   (a) $(-3 + 7i)(4 - 5i)$

   (b) $\dfrac{3 + 2i}{5 + i}$

7. (5pt each) Solve the given equation.

   (a) $x^2 + 2x = 3$

   (b) $3t^2 + 4t - 2 = 0$

8. (10pt) Determine all solutions to

$$\sqrt{3x-1} = 2x + 3$$

9. (10pt) Determine all solutions to

$$\frac{x}{x+4} + \frac{2}{x-4} = 1$$

10. (5pt) Solve the inequality:

$$|3x - 2| \leq 8$$

11. (5pt) Solve the polynomial inequality:

$$x^2 + 3x + 2 \geq x^3 + x + 2$$

12. (5pt) Determine the inverse of the one-to-one function, $f(x) = \dfrac{2x + 1}{x - 3}$.

13. (5pt) Simplify: $\log_2\left(\sqrt{32}\right)$

14. (10pt) If $\ln(a) = 2.2$, and $\ln(b) = 1.8$ and $\ln c = 1.4$, determine $\ln\left(\sqrt{\dfrac{a^2\,b}{c}}\right)$

15. (10pt) Sketch the graph of $f(x) = 10 - 2e^{-x}$. Mark carefully any intercepts and/or asymptotes.

16. (10pt) Determine all solutions:

$$\log_{10}(2x+1) - \log_{10}(x-2) = 1$$

17. (10pt) Solve the linear system of equations

$$\begin{array}{rcrcrcr} x & + & 2y & - & 3z & = & 1 \\ 2x & + & 3y & + & z & = & 6 \\ 3x & - & y & - & z & = & -10 \end{array}$$

18. (10pt) Sheila has a total of \$1000 invested in two different accounts. One account yields 2.4% annual interest and the other yields 2% annual interest. Her total annual interest is \$22.50. How much does she have in each account?

19. (15pt) Graph the system of inequalities and then find the coordinates of the vertex.

$$\begin{aligned} y &\geq 2x - 3 \\ y &\leq 3 - 4x \end{aligned}$$

20. (15pt) Given the function $f(x) = \dfrac{x-1}{x^2-4}$,

(a) Find and label all asymptotes

(b) Find the x and y intercepts.

(c) Graph the function