

1. (a) Find the range R and the domain D of the real function defined by the rule $f(x) = \sqrt{4 - e^{3x}}$. Prove that $f : D \rightarrow R$ is one-to-one and onto and compute f^{-1} . Give the domain and the range for f^{-1} .
- (b) Find the range R and the domain D of the real function defined by the rule $g(x) = \frac{4x-3}{2+3x}$. Prove that $g : D \rightarrow R$ is one-to-one and onto and compute g^{-1} . Give the domain and the range for g^{-1} .
- (c) Let $k : A \rightarrow B$ and $l : B \rightarrow C$, prove that if k and l is one-to-one then $l \circ k$ is one-to-one.
- (d) Find the range R and the domain D of the real function defined by the rule $h(x) = \frac{4e^x-3}{2+3e^x}$. Prove that $h : D \rightarrow R$ is one-to-one and onto and compute h^{-1} . Give the domain and the range for h^{-1} .
2. In this question, we use the function $y = ce^{kt}$ to model radioactive decay. (You could use a different exponential function, but we want you to get some practice using e.) Plutonium-239 has a half-life of 24400 years. We begin with a sample of 10g.
 - (a) Explain what "half-life" is.
 - (b) Find constants c and k for this situation.
 - (c) How long will it take for the original 10g to decay to 1g?
3. (a) Write as a single logarithm

$$1/3\ln(x) + 3\ln(x+1) - 2\ln(x^2+3).$$

- (b) Solve the inequality: $\ln(\sqrt{x-8}) \leq 5$.
4. Identify the center and radius of the circle given by the equation

$$x^2 + y^2 + 2x - 16y + 61 = 0.$$
5. Identify the center and radius of the circle given by the equation

$$x^2 + y^2 - 10x + 4y - 7 = 0$$
6. Write an equation of the circle shown in Figure 11-7.
7. Given: the equation of the parabola

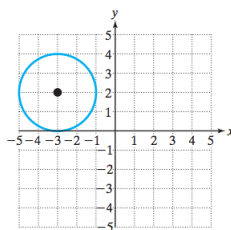


Figure 11-7

8. Given: the equation of the parabola

$$y = 2x^2 + 4x + 1$$

- (a) Write the equation in standard form.
- (b) Identify the vertex and axis of symmetry. Determine if the parabola opens upward or downward.

- (c) Graph the parabola.
9. Given the equation of the parabola $x = 4y^2$,
- Determine the coordinates of the vertex and the equation of the axis of symmetry.
 - Use the value of a to determine if the parabola opens to the right or left.
 - Plot several points and graph the parabola.
10. Given the equation of the parabola $x = y^2 + 8y - 14$,
- Write the equation in standard form.
 - Identify the vertex and axis of symmetry. Determine if the parabola opens upward or downward.
 - Graph the parabola.
11. Find the vertex by using the vertex formula.
- $x = y^2 + 4y + 5$;
 - $y = 1/2x^2 - 3x + 5/2$.
12. Graph the ellipse given by the equation

$$\frac{x^2}{9} + \frac{y^2}{4} = 1$$

13. Graph the ellipse given by the equation

$$25x^2 + y^2 = 25$$

14. Graph the ellipse give by the equation

$$\frac{(x-1)^2}{16} + \frac{(y+3)^2}{4} = 1$$

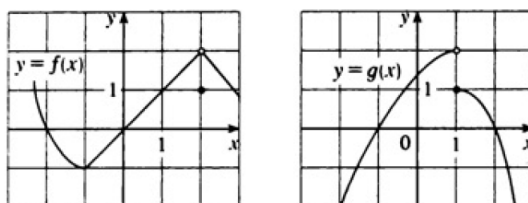
15. Graph the hyperbola given by the equation

$$\frac{x^2}{36} - \frac{y^2}{9} = 1$$

- Determine whether the transverse axis is horizontal or vertical.
 - Draw the reference rectangle and asymptotes.
 - Graph the hyperbola and label the vertices.
16. Graph the hyperbola given by the equation
- $$y^2 - 4x^2 - 16 = 0$$
- Write the equation in standard form to determine whether the transverse axis is horizontal or vertical.
 - Draw the reference rectangle and asymptotes.
 - Graph the hyperbola and label the vertices.
17. Let $[[-]]$ denotes the greatest integer function define in class
- Compute $\lim_{t \rightarrow 10^-} [[-]]$.
 - Compute $\lim_{t \rightarrow 10^+} [[-]]$.
 - Does $\lim_{t \rightarrow 10} [[-]]$ exists?

18. Let $F(x) = \frac{x^2-4}{|x-2|}$
- Compute $\lim_{x \rightarrow 2^-} F(x)$.

- (b) Compute $\lim_{x \rightarrow 2^+} F(x)$.
 (c) Does $\lim_{x \rightarrow 2} F(x)$ exist?
 (d) Sketch a graph for F .
19. Compute $\lim_{t \rightarrow 2} \sqrt{t^2 - 4} \cos\left(\frac{1}{t-2}\right)$.
20. If $\lim_{x \rightarrow 1} \frac{f(x)-8}{x-1} = 10$ find $\lim_{x \rightarrow 1} f(x)$.
21. The graph of f and g are given. Use them to compute the following limits.



- (a) $\lim_{t \rightarrow 1} 4f(t) - 5g(t)$
 (b) $\lim_{t \rightarrow 2} 10f(t) - g(t)$
 (c) $\lim_{t \rightarrow -1} f(t)g(t)$
- 22.
- $$\lim_{t \rightarrow 0} \frac{1}{t\sqrt{t+1}} - \frac{1}{t}$$
- 23.
- $$\lim_{t \rightarrow 9} \frac{3 - \sqrt{t}}{9t - t^2}$$