Section 1.5

1.5.4 Graph the given functions on a common screen. How are these graphs related?

$$y = e^x, y = e^{-x}$$
$$y = 8^x, y = 8^{-x}.$$

Solution: These graphs are reflections of the original function about the y-axis.

1.5.8 Make a rough sketch of the graph of the function. Do not use a calculator. Just use the graphs given in Figures 3 and 12 and, if necessarey, the transformations of Section 1.3.

$$y = 4^{x-3}$$

1.5.11

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

Section 1.6

1.6.54a Find the domain of f.

$$f(x) = \ln(2 + \ln x)$$

Solution: Since ln is only defined for $x > 0$ we need BOTH $x > 0$ and $2 + \ln x > 0$. Solving for x we see: $\ln x > -2$ or $e^{\ln x} > e^{-2}$. This implies $x > 1/e^2$.

Section 2.2 In Problems 26 - 30 determine the infinite limit.

2.2.26

$$\lim_{x\to -3^-} \frac{x+2}{x+3}$$

Solution: As $x \to -3^-$ the numerator $x + 2 \to -1$. The denominator $x + 3 \to 0$. Since the values of x are close to -3 but smaller than -3 the denominator is a small, negative number close to 0. Then the quotient is a large positive number (since the numerator and denominator are both negative). Hence

$$\lim_{x\to -3^-} \frac{x+2}{x+3} = \infty.$$

2.2.28

$$\lim_{x\to 5^-} \frac{e^x}{(x-5)^3}$$

Solution: As $x \to 5^-$ values of x are close to 5 but smaller than 5. Then the values of $x - 5$ are small and negative. Then $(x - 5)^3$ is also a small negative number. The numerator e^x is close to e^5, which is positive. Then the quotient is a large negative number. Hence

$$\lim_{x\to 5^-} \frac{e^x}{(x-5)^3} = -\infty.$$

2.2.30

$$lim_{x \to \pi^-} \cot x$$

Solution: Notice that $\cot x = \frac{\cos x}{\sin x}$. As $x \to \pi^-$, $\sin x \to 0$ but $\sin x$ is a small, positive number. Notice that $\cos x \to -1$. Then the quotient of $\frac{\cos x}{\sin x}$ is a large, negative number. Hence

$$lim_{x \to \pi^-} \cot x \to -\infty.$$