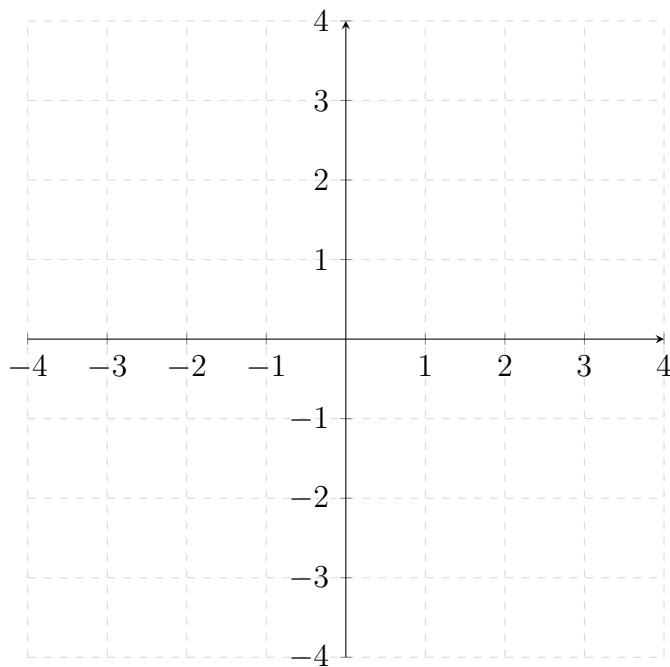


1. State the domain and range of the following functions:

(a)  $f(x) = 2^x$

(b)  $g(x) = \log_2(x + 3)$

Graph both  $f(x)$  and  $g(x)$  below:



2. Solve the following equations for  $x$ :

(a)  $\log_2(x) + \log_2(x - 7) = 3$

(b)  $\ln(x + 2) - \ln(4x + 3) = \ln\left(\frac{1}{x}\right)$

---

3. Carbon-14 has a half life of 5730 years. In 1947, earthenware jars containing what are known as the *Dead Sea Scrolls* were found by an Arab Bedouin herdsman. Analysis indicated that the scroll wrappings contained 77% of their original Carbon-14.

(a) Find the exponential decay model for Carbon-14 using the half life of 5730 years.

(b) Using your model, estimate the age of the scrolls.

4. The following two equations model the population (in millions) for Canada and Uganda  $t$  years after 2006:

$$\text{Canada: } P = 33.1e^{0.009t}$$

$$\text{Uganda: } P = 28.2e^{0.034t}$$

When will Uganda's population exceed Canada's population?

---

5. Assuming the Earth is a perfect sphere of radius 3,959 miles (6,371 kilometers), what is the linear speed of someone sitting on the equator as the Earth spins?
6. At a certain time of day, the angle of elevation of the sun is  $40^\circ$ . To the nearest foot, find the height of a tree whose shadow is 35 feet long at that moment.
7. Find the **exact** value of the following:
- |  |  |
|--|--|
| (a) $\sin\left(\frac{-\pi}{3}\right)$  | (d) $\sec\left(\frac{11\pi}{4}\right)$ |
| (b) $\cos\left(\frac{19\pi}{3}\right)$ | (e) $\csc\left(\frac{5\pi}{3}\right)$  |
| (c) $\tan\left(\frac{-8\pi}{3}\right)$ | (f) $\cot\left(\frac{5\pi}{6}\right)$  |
-

8. Let  $P = (-3, -5)$  be a point on the terminal side of  $\theta$ . What is the value of  $\sin(\theta)$  and  $\cos(\theta)$ ?
9. Find the exact value of  $\sin(\theta)$  and  $\cos(\theta)$  provided  $\tan(\theta) = \frac{-1}{3}$  and  $\sin(\theta) > 0$ .
10. Find the exact value of  $\cot(\theta)$  provided  $\sin(\theta) = \frac{5}{13}$  and  $\theta$  is in quadrant II.
-