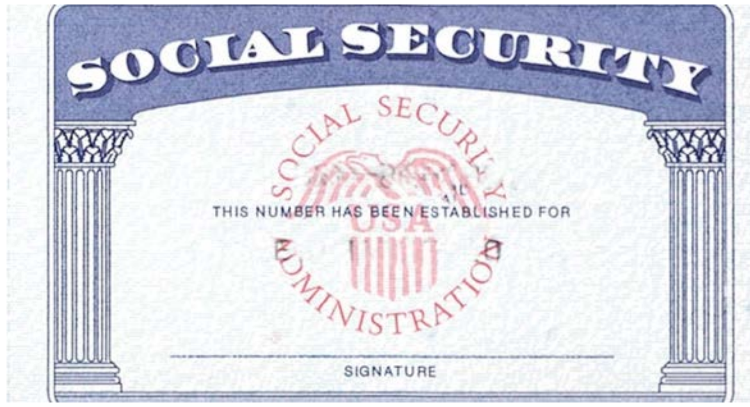
1.14 Maintaining Your Identity

Practice



I. Vertical and horizontal shifts on a graph

A school building is kept warm only during school hours, in order to save money. Figure 6.1 shows a graph of the temperature, G, in °F, as a function of time, t, in hours after midnight.

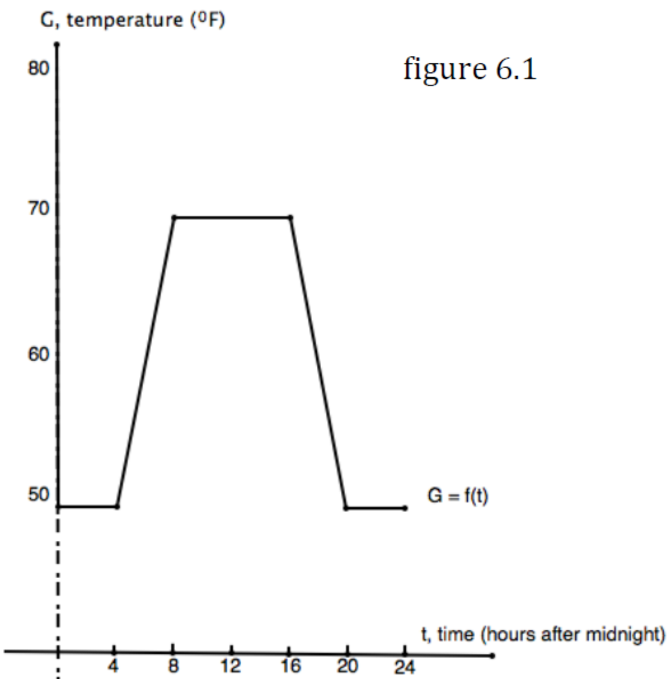


figure 6.1

At midnight ($t = 0$), the building's temperature is 50°F. This temperature remains the same until 4 am. Then the heater begins to warm the building so that by 8 am the temperature is 70°F. That temperature is maintained until 4 pm, when the building begins to cool. By 8 pm, the temperature has returned to 50°F and will remain at that temperature until 4 am.

1. In January many students are sick with the flu. The custodian decides to keep the building 5 °F warmer. Sketch the graph of the new schedule on figure 6.1.

2. If $G = f(t)$ is the function that describes the original temperature setting, what would be the function for the January setting?

3. In the spring, the drill team begins early morning practice. The custodian then changes the original setting to start 2 hours earlier. The building now begins to warm

at 2 am instead of 4 am and reaches 70°F at 6 am. It begins cooling off at 2 pm instead of 4 pm and returns to 50 °F at 6 pm instead of 8 pm. Sketch the graph of the new schedule on figure 6.1.

4. If $G = f(t)$ is the function that describes the original temperature setting, what would be the function for the spring setting?

II. Fundamental Trig Identities

The *Cofunction identities* state: $\sin\theta = \cos(\frac{\pi}{2} - \theta)$ and $\cos\theta = \sin(\frac{\pi}{2} - \theta)$.

Complete the statements, using the *Cofunction identities*

5. $\sin 70° = \cos \quad °$

6. $\sin 28° = \cos \quad °$

7. $\sin 9° = \cos \quad °$

8. $\cos 72° = \sin \quad °$

8. $\cos 54° = \sin \quad °$

10. $\cos\frac{\pi}{8} = \sin \quad °$

9. $\sin\frac{5\pi}{12} = \cos \quad °$

12. $\sin\frac{3\pi}{10} = \cos \quad °$

13. Let $\sin\theta = \frac{3}{4}$.

a) Use the *Pythagorean identity* $(\sin^2\theta + \cos^2\theta = 1)$ to find the value of **cos** .

b. Use the *Quotient identity* $(\tan\theta = \frac{\sin\theta}{\cos\theta})$ the given information, and your answer in part (a) to calculate the value of **tan** .

14. Let $\cos\beta = \frac{12}{13}$.

a) Find β. Use the *Pythagorean identity* $(\sin^2\theta + \cos^2\theta = 1)$.

b) Find β. Use the *Quotient identity* $(\tan\theta = \frac{\sin\theta}{\cos\theta})$

c) Find β. Use a *Cofunction identity.*

Use trigonometric identities to transform the left side of the equation into the right side. Justify your steps.

15. $\tan\theta\cos\theta = \sin\theta$

16. $(1+\cos\beta)(1-\cos\beta) = \sin^2\beta$

17. $(1+\sin\alpha)(1-\sin\alpha) = \cos^2\alpha$

18. $\sin^2 W - \cos^2 W = 2\cos^2 W - 1$

19. $(\cos x + \sin x)(\cos x + \sin x) = \cos 2x$

20. $\sin u\cos u + \sin u\cos u = \sin 2u$

III. Trigonometric values of the special angles

Find two solutions of the equation. Give your answers in degrees ($0° \le \theta \le 360°$) and radians ($0 \le \theta \le 2\pi$). Do not use a calculator.

21. $\sin\theta = \frac{1}{2}$

Degrees:

Radians:

22. $\sin\theta = -\frac{1}{2}$

Degrees:

Radians:

23. $\cos\theta = \frac{\sqrt{2}}{2}$

Degrees:

Radians:

24. $\cos\theta = -\frac{\sqrt{3}}{2}$

Degrees:

Radians:

23. $\tan\theta = -1$

Degrees:

Radians:

23. $\tan\theta = \sqrt{3}$

Degrees:

Radians: