Pre-Calc AB Worksheet 23 : Answers

1. Note there are many possible answers.

   (a) $f(x) = -3\sin(\pi x)$
   $g(x) = 3\cos\left(\pi\left(x + \dfrac{1}{2}\right)\right)$

   (b) $f(x) = 2\sin\left(\dfrac{1}{2}\left(x + \dfrac{\pi}{3}\right)\right)$
   $g(x) = 2\cos\left(\dfrac{1}{2}\left(x - \dfrac{2\pi}{3}\right)\right)$

   (c) $f(x) = 2\sin(x) + 3$
   $g(x) = 2\cos(x - 90°) + 3$
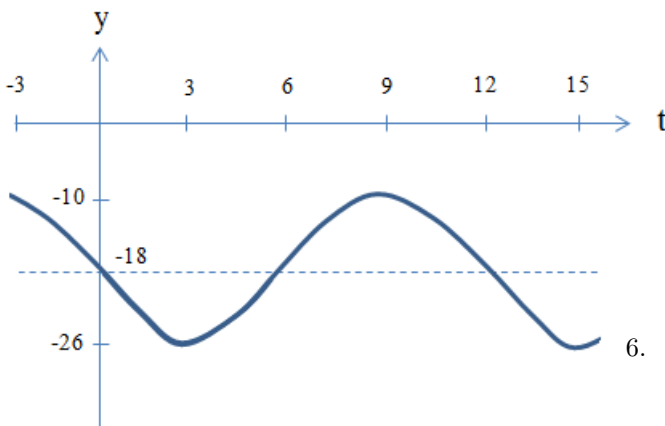
2. (a) D is the midtide level of the water.
   (b) $A = 7.5$ meters
   (c) $B = \dfrac{2\pi}{12.4}$
   (d) C is the time high tide is reached.

3. $f(t) = -8\sin\left(\dfrac{\pi}{6}t\right) - 18$
   or $\quad f(t) = 8\cos\left(\dfrac{\pi}{6}(t+3)\right) - 18$

4. Amplitude is $37°$F; the difference between the average temperature and the high or low themperature.
   Average value is $25°$F; the average temperature for Fairbanks.
   Maximum is $62°$F; the highest temperature for Fairbanks.
   Minimum in $-12°$F; the lowest temperature for Fairbanks.
   Period is 365 days; time between the higest and lowest temperatures for Fairbanks.
   Phase shift is $\dfrac{1.7386 \cdot 365}{2\pi}$ days; the number of days until the average temperature is reached.

5. (a) $\left(-\dfrac{22}{5}, \infty\right)$
   (b) $\mathbb{R}$
   (c) $x = -\dfrac{22}{5}$
   (d) $(0, \log(22) + 8)$
   (e) $\left(\dfrac{10^{-8} - 22}{5}, 0\right)$
   (f) $x = \dfrac{10^{-8} - 22}{5}$
   (g) Horizontally shrunk by a factor of 5, shifted left by $\frac{22}{5}$ units, and then shifted up 8 units.
   (h) $a = \dfrac{78}{5}$

6. (a) $B = -\dfrac{9}{2}$
   (b) $B = -1$
   (c) $x = \dfrac{e^3 - 9}{B}$