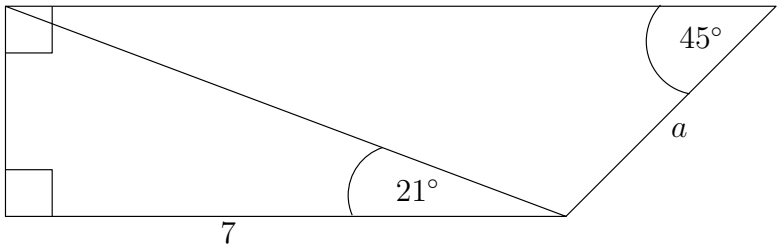
Math 152
Practice Problems for Test 2

The following problems are good practice for the upcoming test. Some are challenging, but completely within the scope of the material we have covered. Round any final calculator answers to 1 decimal.

1. Express $-\frac{5}{2}\cos(2(x-\pi/4)) - \frac{5}{2}$ as a sine function. (a trig identity may help here).
2. The maximum value of $y = \pi^2 \sin(\pi x + 1) + 1$ is $y = \pi^2 + 1$. What is the smallest positive value of x where this maximum occurs?
3. Carefully graph $y = \frac{1}{3}\sin(3x + \pi/2) + \frac{2}{3}$. Be sure to show the x and y axes with labels, as well as the scale on both axes.
4. What is the period of $y = 6\sin(2t)\cos(2t)$?
5. The function $y = \left[\sqrt{3}(\sin t + \cos t)\right]^2$ can be written as a single transformed sine function. Find the period, phase-shift, amplitude and vertical displacement of this function.
6. Compute exactly:
   (i) $\csc(-77\pi/4)$
   (ii) $\sec(13\pi/6 + \pi)$
   (iii) $\cot(1035\pi/6)\tan(1035\pi/6)$
7. Compute exactly, making use of trig identities if necessary:
   (i) $\sec(-\pi/12)$ (hint: $1/4 - 1/6 = 1/12$)
   (ii) $\cos^2(-\pi/8)$
   (iii) $(\sin(\pi/7) + \cos(\pi/7))^2 - \sin(2\pi/7)$
8. Suppose $\cos(\alpha + \pi) = 1/2$. What is $\cos(\alpha)$?
9. Suppose $\sin(\alpha + \pi/6) = 7/8$ and $\cos\alpha = 1/3$. What is $\sin\alpha$?
10. A right triangle has angle α with $\sec\alpha = 3/2$ and hypotenuse of length 6. How long is the side opposite α?
11. A right triangle has angles $90°$, α and β, with $\csc\alpha = 5/4$; what then is $\tan\beta$?
12. Find the length of the side a in the following figure:

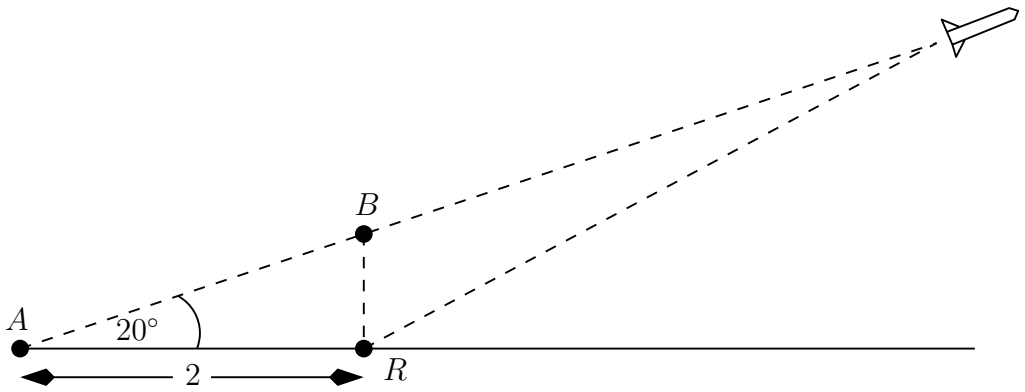


13. A test rocket traveling at 900 km/hr is climbing at an angle of 20° as shown in the figure below. A radar station at point R located 2 km from the launch point A is tracking the rocket.

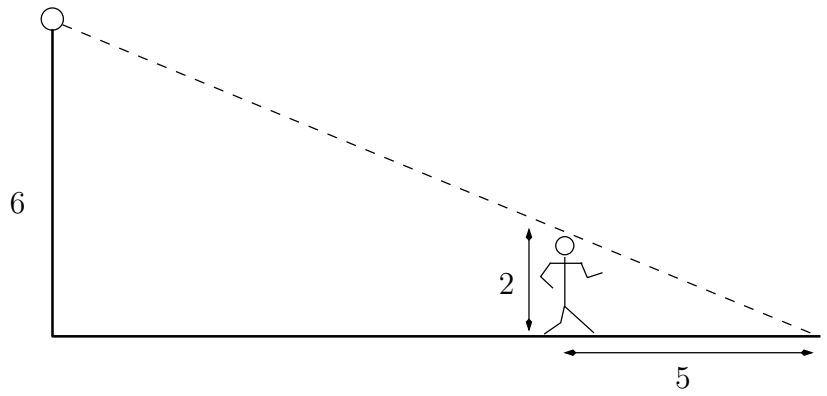
    (i) How far away is the rocket from the radar station 3 seconds after the rocket passes through point B directly overhead?

    (ii) How far is the rocket from the launch point at this same instant?

    (iii) How high above the ground is the rocket at this same instant?



14. A person of height 2 m casts a shadow of length 5 m while standing a certain distance from a light atop a 6 m tall lamppost. How far from the lamppost is the person? (If you think about it you can do this without trig.)



15. Two observers located 5 km apart see a UFO between them in the sky. One observer measures the angle of elevation to the UFO to be 23°, while the other measures it to be 31°. How far is the UFO from each observer, and how far is it above the ground?