1 *When the Eiffel Tower was built (in 1889), the angle of elevation to the top of the tower from a point on the ground 80 feet away from the epicentre of the tower was 85.361°. What was the height of the tower then? (Show at least what equation you solve, and be sure to give correct units. You may leave an exact answer involving trigonometric operations, or you may use a calculator and round your answer, but don't round more than is justified by the number of digits that you give.)*

If h is the height of the tower in feet, then

$$\tan 85.361° = \frac{h}{80},$$

so

$$h = 80 \tan 85.361°.$$

Thus, the height of the tower is

$$80 \tan 85.361° \text{ ft},$$

which is approximately

$$986 \text{ ft}.$$

2 *Evaluate (work out the value of) the following expressions; give exact results, not decimal approximations. (Show at least one intermediate step for each, perhaps identifying a reference angle.)*

a $\sin 150°$

Since $180° - 150° = 30°$, I have

$$\sin 150° = \sin 30° = \frac{1}{2}.$$

b $\tan \dfrac{14\pi}{3}$

Since $14\pi/3 - 2\pi - 2\pi = 2\pi/3$ and $\pi - 2\pi/3 = \pi/3$, I have

$$\tan \frac{14\pi}{3} = \tan \frac{2\pi}{3} = -\tan \frac{\pi}{3} = -\frac{\sqrt{3}/2}{1/2} = -\sqrt{3}.$$