

4. A turkey is taken from a $350^\circ F$ oven into a room with a temperature of $80^\circ F$. Fifteen minutes later, the turkey is 250° . Use Newton's Law of cooling to solve this problem.

(a) Find a formula that will give the temperature of the turkey at time t .

(b) What will the temperature be after 40 minutes?

Section 4.6

$y = \arcsin(x) = \sin^{-1}(x)$ means $\sin y = x$ and $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

$y = \arccos(x) = \cos^{-1}(x)$ means $\cos y = x$ and $0 \leq y \leq \pi$

$y = \arctan(x) = \tan^{-1}(x)$ means $\tan y = x$ and $-\frac{\pi}{2} < y < \frac{\pi}{2}$

5. Find the exact value of the following without the aid of a calculator.

(a) $\sin^{-1}\left(\frac{-1}{2}\right) =$

(b) $\arccos\left(\frac{-\sqrt{2}}{2}\right) =$

(c) $\arctan(-\sqrt{3}) =$

(d) $\tan(\arctan(1.25)) =$

(e) $\sin\left(\arcsin\left(\frac{\pi}{2}\right)\right) =$

(f) $\sin^{-1}\left(\sin\left(\frac{\pi}{2}\right)\right) =$

(g) $\sin^{-1}\left(\sin\left(\frac{11\pi}{9}\right)\right) =$

$$(h) \arccos\left(\cos\left(\frac{16\pi}{9}\right)\right) =$$

$$(i) \arctan\left(\tan\left(\frac{17\pi}{10}\right)\right) =$$

$$(j) \tan\left(\arccos\left(\frac{-5}{13}\right)\right) =$$

$$(k) \sec\left(\arctan\left(\frac{2}{3}\right)\right) =$$

$$(l) \sin\left(2\arctan\left(\frac{2}{3}\right)\right) =$$

6. Write $\tan(\cos^{-1} 3x)$ without any trig functions.

Derivatives of Inverse Trigonometric Functions

$$\frac{d}{dx} \sin^{-1}(x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} \tan^{-1}(x) = \frac{1}{1+x^2}$$

$$\frac{d}{dx} \csc^{-1}(x) = \frac{-1}{x\sqrt{x^2-1}}$$

$$\frac{d}{dx} \cos^{-1}(x) = \frac{-1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} \cot^{-1}(x) = \frac{-1}{1+x^2}$$

$$\frac{d}{dx} \sec^{-1}(x) = \frac{1}{x\sqrt{x^2-1}}$$

7. Prove the derivative rule for $y = \tan^{-1}(x)$.

8. Find the derivatives of the following.

(a) $y = \tan^{-1}(5x)$

(b) $y = x^2 \arcsin(x^2)$

(c) $y = (\cos^{-1}(7x))^3$

Section 4.8

9. $\lim_{x \rightarrow 0} \frac{\sin(x) - x}{x^3}$

10. $\lim_{x \rightarrow \infty} \frac{\ln(x + e^{3x})}{2x}$

11. $\lim_{x \rightarrow 0} \frac{e^x + e^{-x}}{x^2}$

12. $\lim_{x \rightarrow \infty} \left(\frac{x^2}{x-1} - \frac{x^2}{x+5} \right)$

13. $\lim_{x \rightarrow \frac{\pi}{2}} (2x - \pi) \tan(x)$

14. $\lim_{x \rightarrow 0^+} x^x$

15. $\lim_{x \rightarrow 0} (1 - 5x)^{\frac{1}{x}}$