

More problems for section 4.7 of *Essentials of Precalculus with Calculus Previews* by Zill and Dewar, 6e.

Use radians in all questions and answers below.

1. Memorize the domain and range of each of $\sin^{-1} x$, $\cos^{-1} x$, and $\tan^{-1} x$.

2. Find the following. No calculators.

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|---------------------|----------------------------|----------------------------|
| a. $\sin^{-1} 0$ | b. $\sin^{-1} 1$ | c. $\sin^{-1} -1$ |
| d. $\sin^{-1} 1/2$ | e. $\sin^{-1} 1/\sqrt{2}$ | f. $\sin^{-1} \sqrt{3}/2$ |
| g. $\sin^{-1} -1/2$ | h. $\sin^{-1} -1/\sqrt{2}$ | i. $\sin^{-1} -\sqrt{3}/2$ |
| j. $\cos^{-1} 0$ | k. $\cos^{-1} 1$ | l. $\cos^{-1} -1$ |
| m. $\cos^{-1} 1/2$ | n. $\cos^{-1} 1/\sqrt{2}$ | o. $\cos^{-1} \sqrt{3}/2$ |
| p. $\cos^{-1} -1/2$ | q. $\cos^{-1} -1/\sqrt{2}$ | r. $\cos^{-1} -\sqrt{3}/2$ |

3. Find the following. No calculators.

- | | | |
|----------------------------|--------------------------|-------------------|
| a. $\tan^{-1} 0$ | b. $\tan^{-1} \sqrt{3}$ | c. $\tan^{-1} 1$ |
| d. $\tan^{-1} 1/\sqrt{3}$ | e. $\tan^{-1} -\sqrt{3}$ | f. $\tan^{-1} -1$ |
| g. $\tan^{-1} -1/\sqrt{3}$ | | |

4. Find the following. No calculators.

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|------------------------------|----------------------------------|--------------------------|---|
| a. $\sin(\sin^{-1} 1)$ | b. $\sin(\sin^{-1} -.4)$ | c. $\sin(\sin^{-1} 1.2)$ | d. $\sin(\sin^{-1} \sqrt{8})$ |
| e. $\sin(\sin^{-1} 5)$ | f. $\sin(\sin^{-1} \frac{1}{3})$ | g. $\cos(\cos^{-1} -.8)$ | h. $\cos(\cos^{-1} \frac{-1}{3})$ |
| i. $\cos(\cos^{-1} 3.1)$ | j. $\cos(\cos^{-1} 3.14)$ | k. $\cos(\cos^{-1} \pi)$ | l. $\cos(\cos^{-1} \frac{1}{\sqrt{7}})$ |
| m. $\tan(\tan^{-1} 10^{10})$ | n. $\tan(\tan^{-1} 1/10)$ | o. $\tan(\tan^{-1} \pi)$ | |

5. Find the following. No calculators.

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|---------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| a. $\sin^{-1}(\sin \frac{\pi}{3})$ | b. $\sin^{-1}(\sin \frac{2\pi}{3})$ | c. $\sin^{-1}(\sin \frac{-5\pi}{6})$ | d. $\sin^{-1}(\sin \frac{-\pi}{4})$ |
| e. $\sin^{-1}(\sin \frac{\pi}{5})$ | f. $\sin^{-1}(\sin \frac{14\pi}{5})$ | g. $\sin^{-1}(\sin \frac{17\pi}{5})$ | h. $\sin^{-1}(\sin \frac{-5\pi}{8})$ |
| i. $\sin^{-1}(\sin \frac{-11\pi}{9})$ | j. $\sin^{-1}(\sin \pi)$ | k. $\sin^{-1}(\sin \frac{3\pi}{7})$ | l. $\sin^{-1}(\sin \frac{-7\pi}{4})$ |
| m. $\cos^{-1}(\cos 0)$ | n. $\cos^{-1}(\cos \pi)$ | o. $\cos^{-1}(\cos \frac{-\pi}{4})$ | p. $\cos^{-1}(\cos \frac{\pi}{3})$ |
| q. $\cos^{-1}(\cos \frac{8\pi}{7})$ | r. $\cos^{-1}(\cos \frac{-3\pi}{7})$ | s. $\cos^{-1}(\cos \frac{13\pi}{4})$ | t. $\cos^{-1}(\cos \frac{\pi}{2})$ |
| u. $\cos^{-1}(\cos \frac{3\pi}{7})$ | v. $\cos^{-1}(\cos \frac{2\pi}{3})$ | w. $\cos^{-1}(\cos \frac{8\pi}{9})$ | x. $\cos^{-1}(\cos \frac{21\pi}{5})$ |

6. Find the following. No calculators.

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|---------------------------------------|--------------------------------------|------------------------------------|-------------------------------------|
| a. $\tan^{-1}(\tan \frac{-\pi}{3})$ | b. $\tan^{-1}(\tan \frac{3\pi}{4})$ | c. $\tan^{-1}(\tan -\pi)$ | d. $\tan^{-1}(\tan \frac{\pi}{5})$ |
| e. $\tan^{-1}(\tan \frac{31\pi}{9})$ | f. $\tan^{-1}(\tan \frac{-2\pi}{7})$ | g. $\tan^{-1}(\tan \frac{\pi}{2})$ | h. $\tan^{-1}(\tan \frac{-\pi}{9})$ |
| i. $\tan^{-1}(\tan \frac{-18\pi}{7})$ | | | |

7. Find the following. No calculators.

- a. $\cos(\sin^{-1} 2/3)$ b. $\tan(\sin^{-1} 4/5)$ c. $\sec(\sin^{-1} -3/5)$ d. $\csc(\sin^{-1} -1/2)$
e. $\cos(\sin^{-1} 5/3)$ f. $\tan(\sin^{-1} -4/3)$ g. $\sin(\cos^{-1} 3/4)$ h. $\sec(\cos^{-1} -2/3)$
i. $\sin(\cos^{-1} \sqrt{2})$ j. $\tan(\cos^{-1} -1/\sqrt{2})$ k. $\csc(\cos^{-1} -3/7)$ l. $\tan(\cos^{-1} \pi)$
m. $\sin(\tan^{-1} 2)$ n. $\cos(\tan^{-1} 3)$ o. $\cot(\tan^{-1} 2/3)$ p. $\csc(\tan^{-1} 4/5)$
q. $\cos(\tan^{-1} \sqrt{3})$

8. Find the following. No calculators.

- a. $\cos(\sin^{-1} \frac{1}{2} + \sin^{-1}(\frac{-\sqrt{3}}{2}))$ b. $\cos(\sin^{-1}(\frac{-1}{3}) - \cos^{-1} \frac{2}{3})$ c. $\cos(\cos^{-1} \frac{4}{5} + \tan^{-1} \frac{4}{3})$
d. $\cos(2 \tan^{-1}(\frac{-2}{5}))$ e. $\cos(\cos^{-1} \frac{1}{3} - \cos^{-1} \frac{2}{3})$ f. $\cos(\cos^{-1}(\frac{-1}{\sqrt{5}}) + \sin^{-1} \frac{2}{\sqrt{7}})$
g. $\cos(2 \cos^{-1} \frac{2}{\sqrt{7}})$ h. $\cos(\tan^{-1} \frac{3}{4} - \cos^{-1} \frac{1}{\sqrt{5}})$ i. $\sin(\sin^{-1} \frac{1}{2} + \tan^{-1}(\frac{-1}{2}))$
j. $\sin(\tan^{-1} 4 - \cos^{-1} \frac{1}{4})$ k. $\sin(\cos^{-1} \frac{2}{5} + \cos^{-1}(\frac{-3}{5}))$ l. $\sin(\sin^{-1}(\frac{-3}{5}) - \cos^{-1} \frac{3}{5})$
m. $\sin(\cos^{-1} \frac{1}{\sqrt{2}} + \cos^{-1} \frac{\sqrt{3}}{2})$ n. $\sin(\cos^{-1} \frac{-1}{3} - \tan^{-1} \frac{5}{3})$ o. $\sin(2 \tan^{-1}(-\sqrt{2}))$
p. $\sin(2 \cos^{-1} \frac{\sqrt{2}}{2})$

Answers

- 2a. 0 2b. $\pi/2$ 2c. $-\pi/2$ 2d. $\pi/6$ 2e. $\pi/4$ 2f. $\pi/3$ 2g. $-\pi/6$ 2h. $-\pi/4$ 2i. $-\pi/3$ 2j. $\pi/2$ 2k. 0 2l. π 2m. $\pi/3$
2n. $\pi/4$ 2o. $\pi/6$ 2p. $2\pi/3$ 2q. $3\pi/4$ 2r. $5\pi/6$ 3a. 0 3b. $\pi/3$ 3c. $\pi/4$ 3d. $\pi/6$ 3e. $-\pi/3$ 3f. $-\pi/4$ 3g. $-\pi/6$ 4a. 1
4b. $-.4$ 4c. DNE 4d. DNE 4e. DNE 4f. $1/3$ 4g. $-.8$ 4h. $-1/3$ 4i. DNE 4j. DNE 4k. DNE 4l. $1/\sqrt{7}$ 4m. 10^{10}
4n. $1/10$ 4o. π 5a. $\pi/3$ 5b. $\pi/3$ 5c. $-\pi/6$ 5d. $-\pi/4$ 5e. $\pi/5$ 5f. $\pi/5$ 5g. $-2\pi/5$ 5h. $-3\pi/8$ 5i. $2\pi/9$ 5j. 0
5k. $3\pi/7$ 5l. $\pi/4$ 5m. 0 5n. π 5o. $\pi/4$ 5p. $\pi/3$ 5q. $6\pi/7$ 5r. $3\pi/7$ 5s. $3\pi/4$ 5t. $\pi/2$ 5u. $3\pi/7$ 5v. $2\pi/3$ 5w. $8\pi/9$
5x. $\pi/5$ 6a. $-\pi/3$ 6b. $-\pi/4$ 6c. 0 6d. $\pi/5$ 6e. $4\pi/9$ 6f. $-2\pi/7$ 6g. DNE 6h. $-\pi/9$ 6i. $3\pi/7$ 7a. $\sqrt{5}/3$ 7b. $4/3$
7c. $5/4$ 7d. -2 7e. DNE 7f. DNE 7g. $\sqrt{7}/4$ 7h. $-3/2$ 7i. DNE 7j. -1 7k. $7/(2\sqrt{10})$ 7l. DNE 7m. $2/\sqrt{5}$
7n. $1/\sqrt{10}$ 7o. $3/2$ 7p. $\sqrt{41}/4$ 7q. $1/2$ 8a. $\sqrt{3}/2$ 8b. $(4\sqrt{2}-\sqrt{5})/9$ 8c. 0 8d. $21/29$ 8e. $2(1+\sqrt{10})/9$ 8f. $(-\sqrt{3}-4)/\sqrt{35}$
8g. $1/7$ 8h. $2/\sqrt{5}$ 8i. $(2-\sqrt{3})/(2\sqrt{5})$ 8j. $(4-\sqrt{5})/(4\sqrt{17})$ 8k. $(8-3\sqrt{21})/25$ 8l. -1 8m. $(1+\sqrt{3})/(2\sqrt{2})$
8n. $(5+6\sqrt{2})/(3\sqrt{34})$ 8o. $-2\sqrt{2}/3$ 8p. 1