

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.

- |                     |                            |                            |
|---------------------|----------------------------|----------------------------|
| 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.

- |                              |                                  |                          |   |
|------------------------------|----------------------------------|--------------------------|---|
| 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.

- |                                       |                                      |                                      |                                      |
|---------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 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.

- |                                       |                                      |                                    |                                     |
|---------------------------------------|--------------------------------------|------------------------------------|-------------------------------------|
| 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.  $\pi$     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.  $\pi$     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.  $\pi$     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