

Test 2 Study guide
Math 141 section 01
Vignon S. Oussa

10 questions will be picked out of this list of questions for our second test. Workout all of these problems before the test.

1. Convert 132 deg 51 min 44 sec to decimal degrees to 3 decimal places.
2. Convert 12.56 rad to decimal degrees to two decimal places.
3. A circular point $P = (a, b)$ moves clockwise around the circumference of a unit circle starting at $(1, 0)$ and stop after covering a distance of 7.309 units. Find the coordinates of the point P at its final position.
4. Find all zeros and turning points of $y = 3 \cos x$ on the interval $[-\frac{3\pi}{2}, \frac{3\pi}{2}]$.
5. Without the use of a calculator find
 - a $\cos(570 \text{ deg})$
 - b $\csc(300 \text{ deg})$
 - c $\arcsin \frac{\sqrt{2}}{2}$
 - d $\sin [\arccos (-\frac{1}{2})]$
 - e $\csc [\arctan (-1)]$
6. Sketch the graph of $y = -2 \cos \pi x$, $-1 \leq x \leq 3$. Find the amplitude, and the period P of the graph of the function indicated
7. Sketch the graph of the function $f(x) = -3 + 2 \sin(\frac{x}{2})$, $-4\pi \leq x \leq 4\pi$
8. Indicate the amplitude A, the period P and the phase shift for

$$g(x) = -4 \cos\left(\frac{\pi}{2}x + \frac{\pi}{4}\right)$$
$$h(x) = 0.02 \sin\left(2x + \frac{11\pi}{7}\right)$$

9. Without a calculator, sketch the graph of the functions

$$\arctan x$$
$$\arcsin(-x + 1)$$
$$\arccos(x)$$
$$\arccos\left(\frac{x}{2} - 4\right)$$

10. Using the definition of the even and odd functions, prove the following functions are even odd or neither

a

$$f(x) = \frac{\sin(x)}{1 + \tan^2(x)}$$

b.

$$f(x) = \frac{1}{1 + \sin(x)}$$

c

$$g(x) = [\tan(\sin(\cos x))]^2$$

d

$$g(x) = \frac{1}{\tan(\sin(\cos x))}$$

11. Write an algebraic expression in x free of trigonometric or inverse trig functions

$$\sec(\arcsin^{-1} x)$$

12. Verify the following identity

a

$$\frac{1 + \cos y}{1 - \cos y} = \frac{\sin^2 y}{(1 - \cos y)^2}$$

b

$$\frac{\tan x}{\sin x - 2 \tan x} = \frac{1}{\cos x - 2}$$

c

$$\sec^2 \theta - \tan^2 \theta = 1$$

d

$$\cos^2 x (1 + \tan^2 x) = 1$$

e

$$\frac{1}{1 - \sin x} + \frac{1}{1 + \sin x} = 2 \sec^2 x$$

f

$$\frac{1 - \cos^4 \alpha}{1 + \cos^2 \alpha} = \sin^2 \alpha$$

g

$$\sec x + \tan x = \frac{1}{\sec x - \tan x}$$

13. Show that $\sqrt{\sin^2 \theta + \cos^2 \theta} = \sin \theta + \cos \theta$ is not an identity.

14. Find the exact value (not an approximation) of $(\cos 75) ^2$

15. Show that $\cos(x + 2\pi) = \cos x$

16. Write $\cos 3x \cos 2x - \sin 3x \sin 2x$ as a single cosine function.

17. Show that $\cos(90^\circ - A) \sin A = (\sin A)^2$

18. Show that

$$\sin\left(\frac{3\pi}{2} - x\right) = -\cos x$$

19. If $\tan(A + B) = 3$ and $\tan B = \frac{1}{2}$, find $\tan A$

20. Show that

$$\cos\left(x + \frac{3\pi}{2}\right) + \cos\left(x - \frac{3\pi}{2}\right) = 0$$

21. Prove $(\sin \theta + \cos \theta)^2 = 1 + \sin 2\theta$

22. Prove

$$\sin 2x = \frac{2 \cot x}{1 + \cot^2 x}$$

23. If $\sin \theta = \frac{1}{\sqrt{5}}$, find $\cos 2\theta$

24. Prove that $\cos 4x = 8 \cos^4 x - 8 \cos^2 x + 1$. Hint: use the fact that $\cos 4x = \cos(2 \cdot 2x)$, and apply the double angle formula

25. Show that

$$\frac{1 - \tan x}{1 + \tan x} = \frac{1 - \sin 2x}{\cos 2x}$$

26. If $\sin A = -\frac{12}{13}$ with $180^\circ \leq A \leq 270^\circ$, find the six trig functions of $\frac{A}{2}$.

27. Given $f(x) = 4 \cos^2\left(\frac{x}{2}\right)$

(a) Show that $f(x) = 2 + 2 \cos x$ using the half angle formula

(b) Using part a, plot the graph of $4 \cos^2\left(\frac{x}{2}\right)$

28. Prove that

$$\sin^2 \frac{x}{2} = \frac{\tan x - \sin x}{2 \tan x}$$

29. Evaluate

$$\sin\left(\arcsin \frac{3}{5} + \arctan 2\right)$$

30. Find $\cos x$ if $\cos 2x = \frac{1}{2}$

31. Find an exact value for

$$\sin 195^\circ \cos 75^\circ$$

32. Find the exact value for

$$\sin\left(\frac{11\pi}{12}\right) - \sin\left(\frac{7\pi}{12}\right)$$

33. Find the exact value for

$$\cos\left(\frac{17\pi}{12}\right) + \cos\left(\frac{\pi}{12}\right)$$