

Honors PreCalc '12
Trigonometric Functions Test

Name: _____

Score _____

Round to 3 decimal places.
CALCULATOR ALLOWED

1. If $g(x) = x + \cos x$, then $\lim_{h \rightarrow 0} \frac{g(x+h) - g(x)}{h}$

- (a) $\sin x + \cos x$
- (b) $\sin x - \cos x$
- (c) $1 - \sin x$
- (d) $1 - \cos x$
- (e) $x^2 - \sin x$

2. What is the slope of the line tangent to the curve $y = \arctan(4x)$ at the point at which $x = \frac{\pi}{4}$?

- (a) 2
- (b) $\frac{1}{2}$
- (c) 0
- (d) $-\frac{1}{2}$
- (e) -2

3. The first derivative of the function $f(x)$ is defined by $f'(x) = \sin(x^3 - x)$ for $0 \leq x \leq 2$. On what intervals is $f(x)$ increasing?

- (a) $1 \leq x \leq 1.445$ only
- (b) $1 \leq x \leq 1.691$
- (c) $1.445 \leq x \leq 1.875$
- (d) $0.557 \leq x \leq 1.445$ and $1.445 \leq x \leq 2$
- (e) $0 \leq x \leq 1$ and $1.691 \leq x \leq 2$

4. The sales of lumber S (in millions of square feet) for the years 1980 to 1990 is modeled by the function $S(t) = 0.46\cos(0.45t + 3.15) + 3.4$ where t is the time in years with $t = 0$ corresponding to the beginning of 1980. Determine the year when the lumber sales were increasing at the greatest rate.

- (a) 1982
- (b) 1983
- (c) 1984
- (d) 1985
- (e) 1986

Free Response (10 pts. each)

1. Find the extreme values of $y = \frac{1}{2}x + \cos x$ on $x \in (-\pi, \pi)$.

2. Find the extreme values of $y = \sqrt[4]{\sin \pi x}$ on $x \in [0, 1]$.

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5. $\frac{d}{dx} \cos^2(x^3)$

- (a) $6x^2 \sin(x^3) \cos(x^3)$
- (b) $6x^2 \cos(x^3)$
- (c) $\sin^2(x^3)$
- (d) $-6x^2 \sin(x^3) \cos(x^3)$
- (e) $-2 \sin(x^3) \cos(x^3)$

6. An equation of the line tangent to the graph of $y = \cos(2x)$ at $x = \frac{\pi}{4}$ is

- (a) $y - 1 = -\left(x - \frac{\pi}{4}\right)$
- (b) $y - 1 = -2\left(x - \frac{\pi}{4}\right)$
- (c) $y = 2\left(x - \frac{\pi}{4}\right)$
- (d) $y = -\left(x - \frac{\pi}{4}\right)$
- (e) $y = -2\left(x - \frac{\pi}{4}\right)$

7. If $\tan(x + y) = x$, then $\frac{dy}{dx} =$

- (a) $\tan^2(x + y)$
- (b) $\sec^2(x + y)$
- (c) $\ln|\sec(x + y)|$
- (d) $\sin^2(x + y) - 1$
- (e) $\cos^2(x + y) - 1$

8. If $f(x) = \cos(3x)$, then $f'\left(\frac{\pi}{9}\right) =$

(a) $\frac{3\sqrt{3}}{2}$

(b) $\frac{\sqrt{3}}{2}$

(c) $-\frac{\sqrt{3}}{2}$

(d) $-\frac{3}{2}$

(e) $-\frac{3\sqrt{3}}{2}$

Free Response (10 pts. each)

3. List the traits **and** sketch $y = \frac{1}{2}x + \cos x$ on $x \in (-\pi, \pi)$

Domain:

Range:

y-intercept:

Axis Points:

Extreme Values:

VAs:

POEs:

End Behavior:

4. List the traits **and** sketch $y = \sqrt[4]{\sin \pi x}$ on $x \in [0, 1]$.

Domain:

Range:

y-intercept:

Zeros:

Extreme Values:

VAs:

POEs:

End Behavior: