

Math 123 Exam 3A

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NAME: _____

Key

No calculators on pages 1-2.

20 1. Find the exact value:

(a) $\sin\left(\frac{4\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

(b) $\cos\left(\frac{7\pi}{6}\right) = -\frac{\sqrt{3}}{2}$

(c) $\tan\left(-\frac{\pi}{4}\right) = -1$

(d) $\sec\left(\frac{5\pi}{4}\right) = -\sqrt{2}$

(e) $\csc\left(\frac{5\pi}{6}\right) = +2$

(f) $\sin(270^\circ) = -1$

(g) $\cos(-45^\circ) = \frac{1}{\sqrt{2}}$

(h) $\tan(120^\circ) = -\sqrt{3}$

(i) $\sec(210^\circ) = -\frac{2}{\sqrt{3}}$

(j) $\csc(180^\circ) = \text{undefined}$

10 2. If $\sin t = -\frac{4}{5}$, with terminal point $P(t)$ in quadrant III, find the exact value:

(a) $\cos t = -\frac{3}{5}$

(b) $\tan t = \frac{4}{3}$

(c) $\sec t = -\frac{5}{3}$

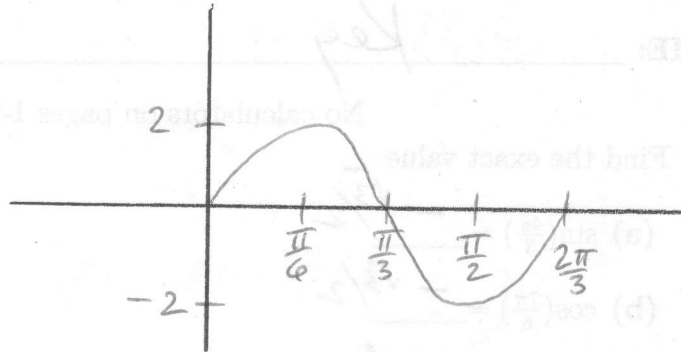
(d) $\csc t = -\frac{5}{4}$

(e) $\cot t = \frac{3}{4}$

3. Let $y = 2 \sin(3x)$.6 (a) amplitude = 2 (b) period = $\frac{2\pi}{3}$ (c) phase shift = 0

8 (d) sketch the graph:

x-axis 4
 y-axis 1
 shape 3

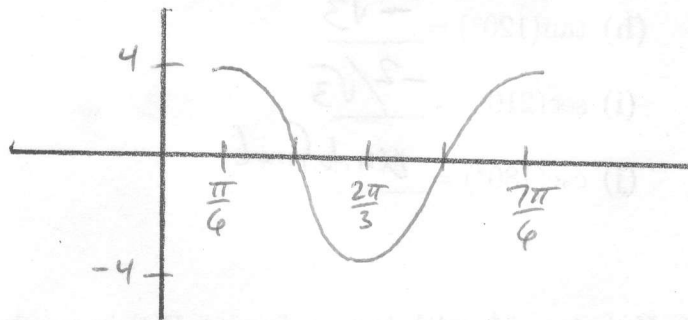
4. Let $y = 4 \cos(2x - \frac{\pi}{3})$.6 (a) amplitude = 4 (b) period = π (c) phase shift = $\frac{\pi}{6}$

8 (d) sketch the graph:

$$0 \leq 2x - \frac{\pi}{3} \leq 2\pi$$

$$\frac{\pi}{3} \leq 2x \leq \frac{7\pi}{3}$$

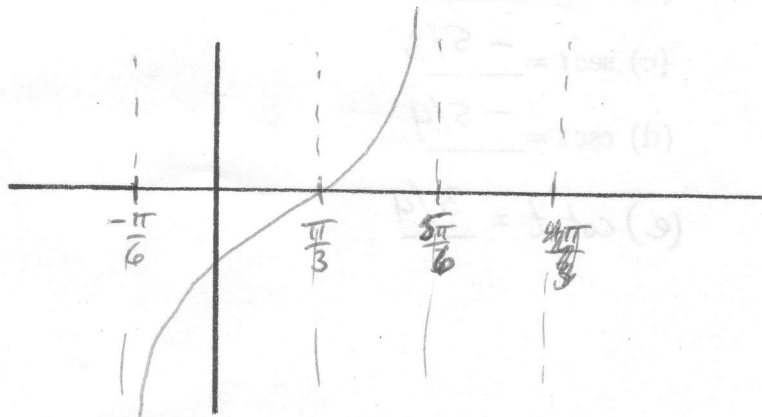
$$\frac{\pi}{6} \leq x \leq \frac{7\pi}{6}$$

5. Let $y = \tan(x - \frac{\pi}{3})$.4 (a) amplitude = N/a (b) period = π (c) phase shift = $-\pi/6$ or $\frac{5\pi}{6}$

7 (d) sketch the graph:

$$-\frac{\pi}{2} \leq x - \frac{\pi}{3} \leq \frac{\pi}{2}$$

$$-\frac{\pi}{6} \leq x \leq \frac{5\pi}{6}$$



6. From a 10 g sample, radioactive Substance X decayed to 4.5 g after 12 days.

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(a) Find the function $A(t)$ that models the mass of Substance X.

$$4.5 = 10e^{r \cdot 12} \Rightarrow 12r = \ln(0.45)$$

$$r = -0.0665$$

$$A(t) = 10e^{-0.0665t}$$

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(b) Find the half-life of Substance X.

$$\frac{1}{2} = e^{rt} \Rightarrow t = \frac{-\ln 2}{r}$$

$$= 10.42 \text{ days}$$

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(c) Find the mass remaining after 17 days.

$$A(17) = 10e^{(-0.0665)(17)}$$

$$= 3.226 \text{ g}$$

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(d) After how many days will only 2 g remain?

$$2 = 10e^{rt} \Rightarrow rt = \ln(0.2)$$

$$t = 24.2 \text{ days}$$