

## STUDY GUIDE FOR MATH 195 MIDTERM 2

### TYPES OF QUESTIONS

Expect there to be three kinds of questions.

- **Conceptual questions** ask you to explain something. These are writing questions.
- **Trig questions** ask you about trig functions: their definitions in terms of the unit circle or right triangles, their graphs and global behavior, their pointwise behavior and solving equations.
- **Polynomial questions** ask you about polynomials: information about zeroes, sign diagrams, and graphing.

### NOTE CARD

You are allowed a 3" × 5" index card for notes (front and back). Put your name on your note card and turn it in with your exam.

Here's some suggestions for what to put on your note card.

- Definitions of the trig functions.
- Info about how to solve trig equations.
- Info about graphing trig functions.
- The process for creating a sign diagram for a polynomial.

### SAMPLE QUESTIONS

- (1) You know that an angle  $\alpha$  is in quadrant II and  $\cos(\alpha) = -3/5$ . Determine the values of the other five trig functions at  $\alpha$ .
- (2) You know that an angle  $\beta$  is in quadrant III and  $\cot(\beta) = 1/4$ . Determine the values of the other five trig functions at  $\beta$ .
- (3) Knowing that  $\sin(\pi/6) = 1/2$ , determine  $\sin(5\pi/6)$ ,  $\sin(7\pi/6)$ , and  $\sin(11\pi/6)$ .
- (4) . A right triangle with angle  $\alpha$  has the side opposite the angle with length 5 and a hypotenuse of length 13. Determine the value of all six trig functions at  $\alpha$ .
- (5) Sketch a graph of the following trig function, showing one full period.

$$a(t) = -3 \tan(2t)$$

- (6) For the following wave, determine its amplitude, centerline, and period. Sketch a graph, showing one full period.

$$b(t) = 2 \sin(\pi t) - 1$$

- (7) For the following wave, determine its amplitude, centerline, and period. Sketch a graph, showing one full period.

$$c(t) = -\cos(t/4) + 1$$

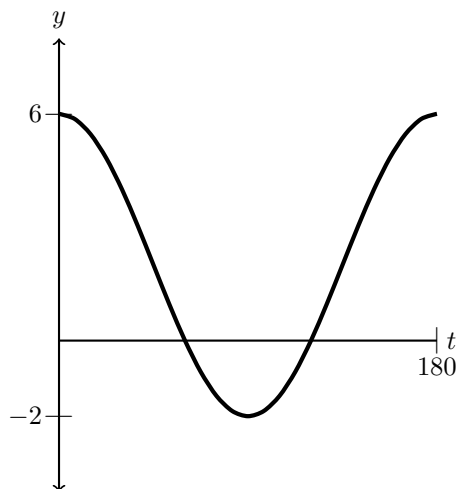
- (8) For the following wave, determine its amplitude, centerline, and period. Sketch a graph, showing one full period.

$$d(t) = -3 \sin(4t) - 2$$

On this period, where is  $d(t)$  increasing? Decreasing? Concave up? Concave down?

- (9) A wave has centerline  $y = 1$ , amplitude 3, and period 4. If at time  $t = 0$  the wave is at its lowest point, write a function modeling the wave.
- (10) A wave has minimum  $y = 1$ , maximum  $y = 11$ , and period  $3\pi$ . If at time  $t = 0$  the wave is at the midpoint moving downward, write a function modeling the wave.

- (11) The graph of one period of a wave is shown below. Write a function modeling the wave.



- (12) Find the general solution to the equation

$$\sin t = 0.$$

- (13) Find the general solution to the equation

$$\cos t = 0.$$

- (14) Find the general solution to the equation

$$\tan t = 0.$$

- (15) Find the general solution to the equation

$$2 \sin(t/3) - 3 = 4.$$

[Hint:  $\sin(\pi/6) = 1/2$ .]

- (16) Find the general solution to the equation

$$3 \cos(2t) = 4.$$

- (17) Find the general solution to the equation

$$2 \tan(3t - \pi/2) + 1 = 4.$$

- (18) A wave is described by the following function. Find all times  $t$  where  $y(t) = 2$ .

$$y(t) = 4 \cos(\pi t) - 1$$

- (19) For the following polynomial, determine its roots and their multiplicities, create a sign diagram, and use that sign diagram to sketch a graph.

$$p(x) = 2x^3(x-1)^2(x-2)^2(x-4)$$

- (20) For the following polynomial, determine its roots and their multiplicities, create a sign diagram, and use that sign diagram to sketch a graph.

$$q(x) = -3(x-2)(x+2)^2(x^2+4)(x^2-9)^4$$

- (21) For the following polynomial, determine its roots and their multiplicities, create a sign diagram, and use that sign diagram to sketch a graph.

$$r(x) = (4-x)(4+x)^4(3+x)^3(2x+1)^2$$

- (22) Determine the domain of the following function.

$$s(x) = \sqrt{(x^2-1)x^2}$$

- (23) Determine the domain of the following function.

$$t(x) = \log_{10}((x-4)(x+2)^2(x-3)^4)$$

(24) Determine the domain of the following function.

$$u(x) = e^{(2x-1)(x+2)^2(x-4)^3}$$

(25) Determine the domain of the following function.

$$v(x) = \sqrt{4 - 2^{-x}}$$

(26) Determine the domain of the following function.

$$w(x) = \log_2((x-1)^3 + 8)$$