

MATH 1103  
COMMON FINAL EXAMINATION  
FALL, 1997

1. Solve  $x(x + 7) = 14$ .

(a)  $x = 14, x = -\frac{1}{2}$

(b)  $\frac{-7 \pm \sqrt{105}}{2}$

(c)  $x = 7, x = 14$

(d)  $x = 0, x = 2$

(e) None of the above

2. Give the domain of  $g(x) = \frac{x}{x^2 - 5x}$ .

(a) All reals except  $x = 0$   $x = 5$

(b)  $x = 0, x = 5$

(c) All reals except  $x = 0$   $x = \sqrt{5}$

(d) All reals except  $x = \pm\sqrt{5}$

(e) None of the above

3. Find the horizontal and vertical asymptotes of  $f(x) = \frac{2}{x} - 3$ .

(a) VA  $x = 0$  HA  $y = -3$

- (b) VA  $y = -3$  HA  $x = 2$
- (c) VA  $x = 3$  HA  $y = 0$
- (d) VA  $y = -2$  HA  $x = 3$
- (e) None of the above
4. Find the end behavior asymptote of  $f(x) = \frac{2x^3 + 7x^2 - 4}{x^2 + 2x - 3}$
- (a)  $y = -12x + 9$
- (b)  $y = 2$
- (c)  $y = \infty$
- (d)  $y = 2x + 3$
- (e) None of the above
5. Solve  $\frac{x - 1}{x + 4} > 3$
- (a)  $x > -4$
- (b)  $x < -\frac{13}{2}$
- (c)  $-\frac{13}{2} < x < -4$
- (d)  $1 > x > 4$
- (e) None of the above
6. Find the equation of the line through  $(6, 1)$  and parallel to  $3x - 5y = 15$ .
- (a)  $y = -\frac{3}{5}x + \frac{23}{5}$

- (b)  $y = \frac{5}{3}x - 9$
- (c)  $y = \frac{3}{5}x - \frac{13}{5}$
- (d)  $y = -\frac{5}{3}x + 11$
- (e) None of the above
7. How much 10% acid solution must be added to 20 liters of a 25% solution in order to obtain a 20% concentration?
- (a) 9 liters
- (b) 10 liters
- (c) 1 liter
- (d) 25 liters
- (e) None of the above
8. Solve  $-4 < \frac{3-x}{4} \leq 7$
- (a)  $-19 < x \leq 25$
- (b)  $-4 \leq x < -7$
- (c)  $-7 \leq x < 19$
- (d)  $-25 \leq x < 19$
- (e) None of the above
9. Find the amplitude and period of  $f(x) = -2 \cos(3x + 1)$ .
- (a) Amp =  $1/3$ , Per =  $2\pi$
- (b) Amp = 4, Per = 3

- (c) Amp = 2 , Per =  $2\pi/3$
- (d) Amp = -2 , Per =  $6\pi$
- (e) None of the above
10. Suppose  $\sin \theta = 2/5$ ,  $\tan \theta < 0$  Evaluate  $\sec \theta$ .
- (a)  $-2/\sqrt{29}$
- (b)  $-5/\sqrt{21}$
- (c)  $\sqrt{29}/2$
- (d)  $\sqrt{21}/5$
- (e) None of the above
11. If  $f(x) = \frac{1}{x-1}$  and  $g(x) = \sqrt{x-1}$ . Find  $(f \circ g)(10)$ .
- (a)  $1/2$
- (b)  $4\sqrt{2}/3$
- (c)  $1/9$
- (d) 3
- (e) None of the above
12. Solve  $|\frac{x+2}{3}| \geq 3$
- (a)  $x \geq 7$
- (b)  $x \geq 7$  or  $x \geq -11$
- (c)  $-11 \leq x \leq 7$

- (d)  $x \leq -11$  or  $x \geq 7$
- (e) None of the above
13. The  $g^{-1}(x)$  of the function  $g(x) = \frac{2x+3}{x-1}$  is
- (a)  $g^{-1}(x) = \frac{x-1}{2x+3}$
- (b)  $g^{-1}(x) = \frac{x+3}{x-2}$
- (c)  $g^{-1}(x) = \frac{2x+2}{x}$
- (d)  $g^{-1}(x) = \frac{-x+3}{-2x-3}$
- (e) None of the above
14. The range of  $f(x) = 2 \tan^{-1}(3x + \pi/2)$  is
- (a)  $(-2, 2)$
- (b)  $x \neq n\frac{\pi}{2}$   $n = \pm 0, 1, 2, \dots$
- (c)  $(-\infty, \infty)$
- (d)  $(-\pi, \pi)$
- (e) None of the above
15. Find the exact  $\theta$  in radians for  $0 \leq \theta < \pi$
- $$\cos \theta = -\sqrt{2}/2.$$
- (a) .7854
- (b)  $3\pi/4$
- (c)  $-2.356$

(d)  $-\pi/4$

(e) None of the above

16. Find all solutions in the interval  $[0, 2\pi]$

$$\tan 2t = \sqrt{3}.$$

(a)  $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

(b)  $.714, 3.855$

(c)  $\frac{\pi}{3}, \frac{4\pi}{3}$

(d)  $\frac{\pi}{6}, \frac{4\pi}{6}, \frac{7\pi}{6}, \frac{10\pi}{6}$

(e) None of the above

17. If  $\tan x = \frac{4}{3}$ ,  $\sec y = \frac{13}{5}$  where  $x, y$  are acute angles. Find  $\sin(x + y)$ .

(a)  $\frac{208}{195}$

(b)  $\frac{56}{65}$

(c)  $-\frac{8}{195}$

(d)  $\frac{16}{65}$

(e) None of the above

18. The function  $2x^3 + 3x^2 - 12x = f(x)$  is decreasing on which intervals?

(a)  $(-1, 1)$

(b)  $(-\infty, 2)$

(c)  $(-2, 1)$

(d)  $(1, \infty)$

(e) None of the above

19. What are the possible rational root of  $f(x) = 6x^4 - x^3 - 4x^2 - x - 2$ ?

(a)  $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{2}, \pm \frac{3}{2}$

(b)  $\pm 1, \pm 2, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{1}{6}$

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

(d)  $-1, \frac{3}{2}$

(e) None of the above

20. Solve  $2 \log_3 x + 1 = 7$ .

(a) 81

(b) 46.7653

(c) 27

(d) 15.5884

(e) None of the above

21. Observer A is 2 miles from observer B when each see a hot-air balloon between them. The angle of elevation to the balloon from A is  $35^\circ$ . The angle of elevation from B is  $50^\circ$ . Find the altitude of the balloon.

(a) .88 mi

(b) 1.26 mi

(c) 2.10 mi

(d) 2.38 mi

(e) None of the above

22. If  $\angle B = 35^\circ$ ,  $C = 19$ ,  $A = 43$  of  $\triangle ABC$  find  $\angle A$ .
- (a)  $29.5^\circ$
  - (b)  $56.7^\circ$
  - (c)  $46.2^\circ$
  - (d)  $62.8^\circ$
  - (e) None of the above
23. The population in Silver Run in the year 1890 is 6250. If the population increases annually by 2.75% per year, the population in 1940 is closest to.
- (a) 24265
  - (b) 24719
  - (c) 57878
  - (d) 18499
  - (e) None of the above
24. The graph of  $y = -\log(x + 4)$  can be obtained as transformations of  $y = \log x$ . Which of the following transformations must be used?
- I. Reflection in the  $x$ -axis
  - II. Reflection in the  $y$ -axis
  - III. Move 4 units up
  - IV. Move 4 places left
  - V. Move 4 places right

- (a) III, II
- (b) IV, II
- (c) V, I
- (d) I, IV
- (e) III, V

25. A wheel of diameter 8 inches makes 4 revolutions. Approximately how far has it moved?

- (a) 201
- (b) 100.5
- (c) 32
- (d) 16
- (e) None of the above