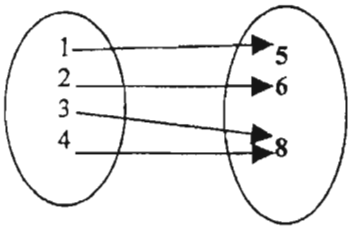
The following 21 multiple choice questions are worth 5 points each.

1. Which of the following relations are functions?

I. $\{(8, 0), (5, 4), (9, 3), (3, 8)\}$

II. $x^2 + y^2 = 1$

III.



a. All are functions

b. None are functions

c. Only II is a function

d. Only I and II are functions

e. Only I and III are functions

2. Solve the inequality: $-5 \leq \frac{2x+8}{3} < \frac{7}{3}$

a. $\left[\frac{1}{2}, 5\right)$

b. $\left[\frac{1}{2}, \frac{23}{2}\right)$

c. $\left[-5, -\frac{1}{2}\right)$

d. $\left[-\frac{13}{2}, -\frac{1}{2}\right)$

e. $\left[-\frac{23}{2}, -\frac{1}{2}\right)$

3. Given $f(x) = 2x^2 - 3x + 1$, find the difference quotient $\frac{f(x+h)-f(x)}{h}$.

a. $4x + 2h - 3$

b. $4x + 2h$

c. 1

d. $2x^2 + h$

e. $2h^2 + 3h + 1$

4. Solve $\frac{x+3}{x-2} + \frac{1}{x+2} = 1$.

a. $x = -3 \pm \sqrt{6}$

b. $x = -8$

c. $x = \frac{1 \pm \sqrt{33}}{2}$

d. $x = -\frac{4}{3}$

e. None of the preceding

5. Solve the equation $3x^2 + 2x - 6 = 0$.

a. $x = \frac{-1 \pm 2\sqrt{19}}{6}$

b. $x = \frac{-1 \pm \sqrt{19}}{3}$

c. $x = \frac{-2 \pm \sqrt{19}}{6}$

d. x = 6 or $x = -\frac{4}{3}$

e. There are no real number solutions.

6. Solve the inequality: $2x^2 + 7x - 4 \geq 0$.

a. $\left[-4, \frac{1}{2}\right]$

b. $\left[-\frac{1}{2}, 4\right]$

c. $\left(-\infty, -\frac{1}{2}\right] \cup [4, \infty)$

d. $(-\infty, -4] \cup \left[\frac{1}{2}, \infty\right)$

e. $(-\infty, -4] \cup \left[-\frac{1}{2}, \infty\right)$

7. A tennis ball is hit upward with an initial velocity of 48 feet/second and an initial height of 3 feet. What is the maximum height of the tennis ball? Use $h(t) = -16t^2 + v_0 t + h_0$.

a. 39 feet

b. 42.5 feet

c. 45.25 feet

d. 52 feet

e. None of the preceding

8. Determine the equation of the line perpendicular to $4x - 3y = 8$ and through the point (2, 3). What is the *y*-intercept of this new line?

a. $\frac{8}{3}$

b. $-\frac{3}{4}$

c. $\frac{9}{2}$

d. $\frac{3}{2}$

e. 3

9. The area of a rectangular garden is 95 square feet. The garden is to be enclosed on three sides by a brick wall costing \$15 per foot and on one side by a fence costing \$10 per foot. If x represents the length of the fence, determine the cost to enclose the garden, C, as a function of x.

a. $C = 25x + \frac{95}{x}$

b. $C = 25x + \frac{2850}{x}$

c. $C = 55x$

d. $C = 55x + \frac{2850}{x}$

e. $C = 55x + \frac{95}{x}$

10. Determine the domain and range of the function $f(x) = -\frac{1}{x+3} + 2$.

a. Domain: $(-\infty, -3) \cup (-3, \infty)$ Range: $(2, \infty)$

b. Domain: $(-\infty, 3) \cup (3, \infty)$ Range: $(-\infty, 2) \cup (2, \infty)$

c. Domain: $(-\infty, -3) \cup (-3, \infty)$ Range: $(-\infty, 2) \cup (2, \infty)$

d. Domain: $(-\infty, 0) \cup (0, \infty)$ Range: $(0, \infty)$

e. Domain: $(-\infty, -3) \cup (-3, \infty)$ Range: $(-\infty, 2)$

11. Solve for $\log_a(x+1) + \log_a x = \log_a(x+2)$

a. $x = \sqrt{2}$

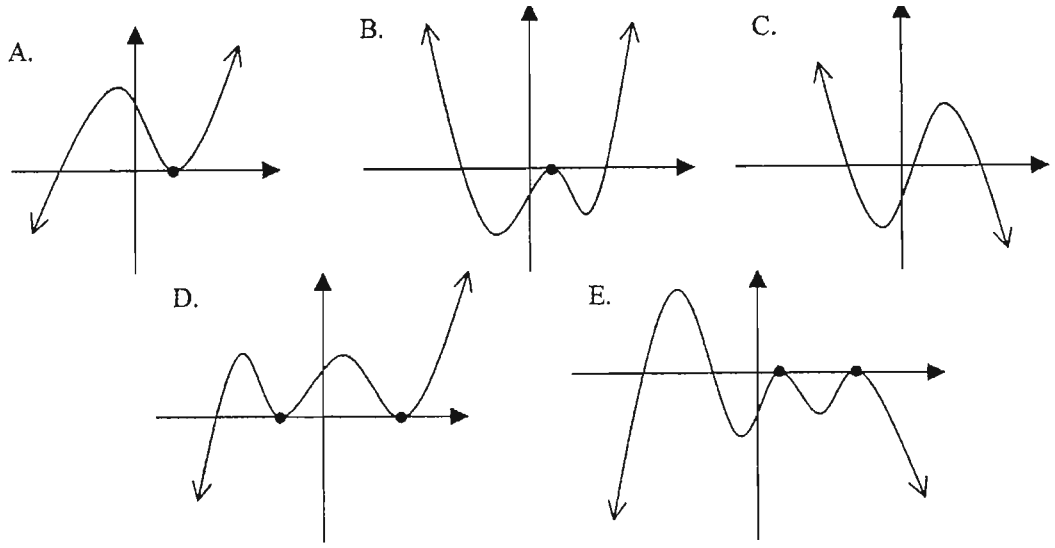
b. $x = -\sqrt{2}$

c. $x = 2$

d. $x = -2$

e. None of the preceding.

The following are comprehensive graphs of polynomial functions. Use the graphs to answer questions 12 - 14.



12. Which graph(s) could represent a polynomial of degree 4?

a. A, C, D
b. A, C
c. B, E
d. B
e. E

13. Which graphs must represent a polynomial with a positive leading coefficient?

a. A, B, D
b. A, C
c. B, D
d. A, D, E
e. A, D

14. Which graphs have a zero(s) of even multiplicity?

a. A, B, D
b. A, B, D, E
c. A, C, D, E
d. B, D, E
e. B, C, D

15. Find the inverse of the function $f(x) = e^{x+3} - 5$.

a. $f^{-1}(x) = e^{x-3} + 5$

b. $f^{-1}(x) = \ln(x + 5) - 3$

c. $f^{-1}(x) = \frac{1}{e^{x+3}-5}$

d. $f^{-1}(x) = \ln(x + 2)$

e. $f^{-1}(x) = \ln(x + 3) - 5$

16. If θ is in the 4th quadrant, which of the following statements is/are:

I. $\sin(\theta) > 0$ and $\cos(\theta) > 0$
II. $\cos(\theta) > 0$ and $\tan(\theta) > 0$
III. $\csc(\theta) > 0$ and $\cos(\theta) > 0$

a. Only I is true

b. Only II is true

c. Only II and III are true

d. Only I and II are true

e. None are true

17. Suppose the terminal side of angle θ contains the point (2, -1). Find the value of $\sin(\theta)$.

a. $-\frac{1}{2}$

b. $\frac{1}{2}$

c. $-\frac{1}{\sqrt{5}}$

d. $\frac{1}{\sqrt{5}}$

e. $\frac{2}{\sqrt{5}}$

18. Use identities to solve for $5\sin(\theta) = 2\cos^2(\theta) - 4$, if $0 < \theta < \pi$.

a. $\pi/6$

b. $\pi/3$

c. $\pi/2$

d. $2\pi/3$

e. $5\pi/6$

19. Which of the following is equivalent to $\frac{\cot^2 t}{\csc t}$?

a. $\csc t - \sin t$

b. $\cot^2 t \csc t$

c. $\cot t \csc t$

d. $\cot t \cos t$

e. $\tan^2 t \sec t$

20. If $\sin\theta = -\frac{a}{13}$ and θ is in quadrant III, $\sin 2\theta$.

a. $\sin 2\theta = \frac{2a^2 - 26a}{169}$

b. $\sin 2\theta = \frac{-2a\sqrt{169 - a^2}}{169}$

c. $\sin 2\theta = \frac{2a\sqrt{169 - a^2}}{169}$

d. $\sin 2\theta = \frac{2a^2 - 26a}{13}$

e. $\sin 2\theta = \frac{2a\sqrt{169 - a^2}}{13}$

21. Which of the following is equivalent to $\sin\left(\frac{7\pi}{6}+\theta\right)$?

a. $-\frac{1}{2}\left(\cos\theta+\sqrt{3}\sin\theta\right)$

b. $\frac{1}{2}\left(\cos\theta+\sqrt{3}\sin\theta\right)$

c. $\frac{1}{2}\left(3\cos\theta+\sin\theta\right)$

d. $-\frac{1}{2}\left(3\cos\theta+\sin\theta\right)$

e. $-\frac{1}{2}+\sin\theta$

The following questions are worth 3 points each.

Consider the following functions:

$$f(x) = (x+30)^2 - 50 \qquad g(x) = \log_3(x+30) - 50$$

$$h(x) = 10(x+30)^2(x+50)^2 \qquad k(x) = 4^{x+30} - 50$$

$$r(x) = \sqrt{x+30} - 50$$

Domain Choices		Range Choices		Asymptote Choices	
a.	$(-\infty, \infty)$	a.	$(-\infty, \infty)$	a.	None
b.	$[-30, \infty)$	b.	$[-30, \infty)$	b.	$x = -30$
c.	$(-30, \infty)$	c.	$(-50, \infty)$	c.	$y = -50$
d.	$[0, \infty)$	d.	$[-50, \infty)$	d.	$y = -30$
e.	$[50, \infty)$	e.	$[0, \infty)$	e.	$x = -50$

Find the following characteristics for each function and then choose the correct response from the table above.

Domain		Range		Asymptote	
22.	$f(x)$	27.	$f(x)$	32.	$f(x)$
23.	$g(x)$	28.	$g(x)$	33.	$g(x)$
24.	$h(x)$	29.	$h(x)$	34.	$h(x)$
25.	$k(x)$	30.	$k(x)$	35.	$k(x)$
26.	$r(x)$	31.	$r(x)$	36.	$r(x)$

M115 – Spring 2010 – Final Exam Multiple Choice Key – WHITE

Question	Correct Response
1	E
2	E
3	A
4	D
5	B
6	D
7	A
8	C
9	B
10	C
11	A
12	D
13	A
14	B
15	B
16	E
17	C
18	No Correct Answer
19	A or D
20	C
21	A
22	A
23	C
24	A
25	A
26	B
27	D
28	A
29	E
30	C
31	D
32	A
33	B
34	A
35	C
36	A