

MATH 1100 COMMON FINAL EXAM, SPRING 2011 (final version S)

(1) Simplify the rational expression.

$$\frac{2x^2-16x+32}{x-4}$$

- (a) $2x - 8$
- (b) $x^2 + 1$
- (c) $x - 4$
- (d) $x + 4$
- (e) No solution.

(2) Simplify.

$$\sqrt{16x^4}$$

- (a) $16x$
- (b) $4x^2$
- (c) $4x^4$
- (d) $16x^2$
- (e) $8x^2$.

(3) Simplify.

$$\frac{32x^{\frac{3}{4}}}{8x^{\frac{1}{3}}}$$

- (a) $4x^{\frac{5}{6}}$
- (b) $24x^{\frac{5}{12}}$
- (c) $4x^{\frac{1}{6}}$
- (d) $4x^{\frac{5}{4}}$
- (e) $4x^{\frac{5}{12}}$.

(4) Rationalize the denominator.

$$\frac{\sqrt{25}}{\sqrt{7}}$$

- (a) $\frac{7\sqrt{7}}{5}$
- (b) 35
- (c) $5\sqrt{7}$
- (d) $\frac{5\sqrt{7}}{7}$
- (e) $\frac{25\sqrt{7}}{7}$.

(5) Factor the trinomial.

$$9x^2 + 12x + 4$$

- (a) $(3x - 1)(3x - 4)$
- (b) $(3x + 1)(3x + 4)$
- (c) $(3x + 2)(3x + 2)$
- (d) $(3x + 2)(3x - 2)$
- (e) $(9x + 2)(x + 2)$.

(6) Simplify.

$$\frac{1 - \frac{1}{x}}{x - 1}$$

- (a) $\frac{1}{x - 1}$
- (b) $\frac{1}{x}$
- (c) x
- (d) $x - 1$
- (e) 1.

(7) Solve the equation.

$$3x - 7 = 14$$

- (a) 7
- (b) 3
- (c) 5
- (d) 6
- (e) Solution does not exist.

(8) Solve the equation.

$$\frac{2x}{5} = \frac{x}{3} + 4$$

- (a) 30
- (b) 40
- (c) 120
- (d) 50
- (e) 60.

(9) Solve the formula for b .

$$A = \frac{1}{2}bh$$

- (a) $\frac{h}{2A}$
- (b) $\frac{A}{2h}$
- (c) $\frac{2h}{A}$
- (d) $\frac{2A}{h}$
- (e) $\frac{h}{A}$.

(10) You inherit \$10,000 and will invest the money in two stocks paying 6% and 11% annual interest, respectively. How much should be invested at each rate if the total

interest earned for the year is to be \$900?

- (a) \$1,000 invested at 6%; \$9,000 invested at 11%.
- (b) \$2,000 invested at 6%; \$8,000 invested at 11%.
- (c) \$3,000 invested at 6%; \$7,000 invested at 11%.
- (d) \$4,000 invested at 6%; \$6,000 invested at 11%.
- (e) \$5,000 invested at 6%; \$5,000 invested at 11%.

(11) Solve the radical equation and check all proposed solutions.

$$\sqrt{14x - 21} = x + 2$$

- (a) 8
- (b) -6
- (c) 6
- (d) -5
- (e) 5.

(12) Solve the inequality.

$$3x + 10 < 34$$

- (a) $(-\infty, 8]$
- (b) $(-\infty, 8)$
- (c) $(-\infty, -8)$
- (d) $(8, \infty)$
- (e) $(-8, 8)$.

(13) Solve the inequality.

$$|x - 1| - 4 \leq 5$$

- (a) $[-8, 10]$
- (b) $[-10, 8]$
- (c) $(-8, 10)$
- (d) $(-10, 8)$
- (e) $[-9, 9]$.

(14) Solve the quadratic inequality.

$$x^2 - x - 6 > 0$$

- (a) $(-\infty, -3) \cup (2, \infty)$
- (b) $(-\infty, 2) \cup (3, \infty)$
- (c) $(-\infty, -2) \cup (3, \infty)$
- (d) $(-\infty, -2)$
- (e) $(3, \infty)$.

(15) Solve the rational inequality.

$$\frac{x-3}{x+2} < 0$$

- (a) $(-2, 3]$
- (b) $(-3, 2)$
- (c) $(-2, 3)$
- (d) $(-\infty, 3)$
- (e) $(-2, \infty)$.

(16) Using the distance formula find the distance from $A(1, -1)$ to $B(4, -3)$.

- (a) $\sqrt{13}$
- (b) 5
- (c) $\sqrt{15}$
- (d) 3
- (e) $2\sqrt{2}$.

(17) Find the slope of the line passing through $A(1, -1)$ and $B(4, -3)$.

- (a) $-\frac{1}{2}$
- (b) $\frac{2}{3}$
- (c) $-\frac{2}{3}$
- (d) $\frac{1}{2}$
- (e) $-\frac{3}{4}$.

(18) Find the equation of the line passing through $P(0, 1)$ and parallel to the line $2x + y = 3$.

- (a) $y = -2x - 1$
- (b) $y = 2x + 1$
- (c) $y = -2x + 1$
- (d) $y = 2x - 1$
- (e) $3x + 2y = -1$.

(19) Find the even function in the five functions.

- (a) $y = x^3 - 2$
- (b) $y = 2x - 1$
- (c) $y = x^3 - x$
- (d) $y = x^4 - x^2$
- (e) $y = x^4 - x^3$.

(20) Find the center and radius of the following circle.

$$x^2 + y^2 + 10x - 12y - 3 = 0$$

- (a) $(-4, 5), r = 7$
- (b) $(-5, -6), r = 8$
- (c) $(5, 6), r = 8$
- (d) $(5, -6), r = 8$
- (e) $(-5, 6), r = 8$.

(21) Find the coordinates of the midpoint M of $A(1, 2)$ and $B(6, -3)$.

- (a) $(3.5, -0.5)$
- (b) $(6, -1)$
- (c) $(5, 0)$
- (d) $(0, 0)$
- (e) $(1, 1)$.

(22) Evaluate the value $A = f(0) + f(4)$ where the function $f(x)$ is defined as following

$$f(x) = \begin{cases} 2x - 1 & x \leq 2 \\ x^2 + 1 & x > 2 \end{cases}$$

- (a) 8
- (b) 16
- (c) 12
- (d) 10
- (e) 9.

(23) If point $(2, 8)$ is on the graph of a one-to-one function $f(x)$, find the value of $f^{-1}(8)$.

- (a) 2
- (b) $\frac{1}{2}$
- (c) $\frac{1}{8}$
- (d) 8
- (e) 5.

(24) For $f(x) = 2x - 1$ and $g(x) = x^2 + x + 1$, evaluate the value $f \circ g(2)$.

- (a) 12
- (b) 13
- (c) 14
- (d) 15
- (e) 16.

(25) Find the domain of the function $f(x)$.

$$f(x) = \sqrt{x+1}$$

- (a) $[-1, 1]$
- (b) $(-\infty, -1)$

- (c) $[1, \infty)$
- (d) $[-1, \infty)$
- (e) $(-1, \infty)$.

(26) Divide $4x^3 - 6x^2 - 5x + 6$ by $x + 3$, find the remainder R.

Hint, Use the Remainder Theorem or Synthetic Division

- (a) $R = 3$
- (b) $R = 21$
- (c) $R = -141$
- (d) $R = -138$
- (e) $R = 241$.

(27) Find the vertex of the parabola $f(x)$.

$$f(x) = 2x^2 - 8x - 1$$

- (a) $(2, -1)$
- (b) $(4, -9)$
- (c) $(2, -8)$
- (d) $(-2, -9)$
- (e) $(2, -9)$.

(28) Find the inverse function for $f(x) = 4x - 3$.

- (a) $f^{-1}(x) = \frac{1}{4}x + \frac{3}{4}$
- (b) $f^{-1}(x) = \frac{3}{4}x + \frac{1}{4}$
- (c) $f^{-1}(x) = \frac{1}{4}x - \frac{3}{4}$
- (d) $f^{-1}(x) = -\frac{1}{4}x + \frac{3}{4}$
- (e) $f^{-1}(x) = \frac{1}{4}x + \frac{5}{4}$.

(29) The graph of polynomial function $f(x) = a(x+1)^2(x-2)$ passes through point $(1, 2)$. Find the value a.

- (a) 5
- (b) $\frac{3}{2}$
- (c) 2
- (d) $-\frac{1}{2}$
- (e) 1.

(30) Solve the equation for all real solutions given that $x = 1$ is a zero.

$$x^3 + x^2 - 3x + 1 = 0.$$

Hint: $(x-1)$ is a factor. Using synthetic division and quadratic formula.

- (a) $\{-1 - \sqrt{3}, -1 + \sqrt{3}, 1\}$
- (b) $\{1 - \sqrt{2}, 1 + \sqrt{2}, 1\}$
- (c) $\{-1 - \sqrt{2}, -1 + \sqrt{2}, 1\}$
- (d) $\{1, 2\}$
- (e) $\{1\}$.

(31) Find all vertical asymptotes for the function $f(x) = \frac{x^2}{x^2 - 5x + 6}$.

- (a) $x = -1, x = -3$
- (b) $y = 1$
- (c) $x = 2, x = 3$
- (d) $x = 1$
- (e) No vertical asymptote.

(32) Find the horizontal asymptote for the function $f(x) = \frac{2x^2 + x - 1}{x^2 - 5x + 6}$.

- (a) $y = 2$
- (b) $y = 1$
- (c) $y = \frac{1}{2}$
- (d) $y = -2$
- (e) No horizontal asymptote.

(33) The amount of gas that a helicopter uses is directly proportional to the number of hours spent flying. The helicopter flies for 3 hours and uses 33 gallons of fuel. Find the number of gallons of fuel that the helicopter uses to fly for 4 hours.

- (a) 25 gallons
- (b) 39 gallons
- (c) 44 gallons
- (d) 22 gallons
- (e) 45 gallons

(34) Use your calculator to calculate $(12.24)^{1.7}$. Round your answer to two decimal digits.

- (a) 25.87
- (b) 80.15
- (c) 5.22
- (d) 20.81
- (e) 70.67

(35) Use the properties of logarithms to write $\ln \sqrt{\frac{x}{x-1}}$ as a sum or difference of simple logarithmic terms.

- (a) $\ln x - \frac{1}{2} \ln(x - 1)$
- (b) $\frac{1}{2} \ln x + \frac{1}{2} \ln(x - 1)$
- (c) $\frac{1}{2} \ln x - \frac{1}{2} \ln(x + 1)$
- (d) $\frac{1}{2} \ln x - \frac{1}{2} \ln(x - 1)$

(e) $\frac{1}{2} \ln x - \ln(x - 1)$

(36) Solve the equation $2^{3x} = 15$.

- (a) 7.42
- (b) 2.18
- (c) 1.30
- (d) 7.5
- (e) 5

(37) Use your calculator to calculate $\log_2 3$. Round your answer to two decimal digits.

- (a) 5.88
- (b) 3.15
- (c) 0.48
- (d) 1.10
- (e) 1.58

(38) Solve the equation $\ln(x + 1) = 0$.

- (a) 0
- (b) 1
- (c) 2
- (d) 3
- (e) No solution.

(39) In year 1811, Mr. Jokerman invested 1 dollar at the rate of 8%, compounded quarterly. Find his account balance today, year 2011. Round your answer to nearest dollar.

- (a) \$7,588,176
- (b) \$75,882
- (c) \$7,588
- (d) \$759
- (e) \$128

(40) Solve the system.

$$\begin{aligned}4x + 54y &= 54 \\6x - 9y &= -9\end{aligned}$$

- (a) $x = 0, y = 1$
- (b) $x = 1, y = 0$
- (c) $x = 1, y = 1$
- (d) $x = 0, y = 0$
- (e) No solution.