Name _____ *Take Home Test 2 MR12*

Please attach additional supporting work. This will count as a test grade. Due 2/28/11

1 What is the solution of the inequality $|x+3| \le 5$?

(1) $-8 \le x \le 2$ (3) $x \le -8$ *or* $x \ge 2$

(2) $-2 \le x \le 8$ (4) $x \le -2$ *or* $x \ge 8$

2 What is the domain of $f(x) = 2^x$?

(1) all integers (3) $x \ge 0$

(2) all real numbers (4) $x \le 0$

3 A function is defined by the equation $y = 5x - 5$. Which equation defines the inverse of this function?

(1) $y = \frac{1}{5x-5}$ (3) $x = \frac{1}{5y-5}$

(2) $y = 5x+5$ (4) $x = 5y-5$

4 In the equation $\log_x 4 + \log_x 9 = 2$, x is equal to

(1) $\sqrt{13}$ (3) 6.5

(2) 6 (4) 18

5 Which expression represents the sum of $\frac{1}{\sqrt{3}} + \frac{1}{\sqrt{2}}$?

(1) $\frac{2\sqrt{3}+3\sqrt{2}}{6}$ (3) $\frac{\sqrt{3}+\sqrt{2}}{3}$

(2) $\frac{2}{\sqrt{5}}$ (4) $\frac{\sqrt{3}+\sqrt{2}}{2}$

6 Which equation has imaginary roots?

(1) $x^2 - 1 = 0$ (3) $x^2 + x + 1 = 0$

(2) $x^2 - 2 = 0$ (4) $x^2 - x - 1 = 0$

7 If $\log k = c\log v + \log p$, k equals

(1) $v^c p$ (3) $v^c + p$

(2) $(vp)^c$ (4) $cv + p$

8 Expressed in simplest form, $i^{16} + i^6 - 2i^5 + i^{13}$ is equivalent to

(1) 1 (3) i

(2) -1 (4) $-i$

9 If the point (a, b) lies on the graph $y = f(x)$, the graph of $y = f^{-1}(x)$ must contain point

(1) (b,a) (3) $(0,b)$

(2) $(a,0)$ (4) $(-a,-b)$

10 If the sum of the roots of $x^2 + 3x - 5$ is added to the product of its roots, the result is

(1) 15 (3) –2

(2) –15 (4) –8

11 The expression $\frac{3^{\frac{1}{3}}}{3^{-\frac{2}{3}}}$ is equivalent to

(1) 1 (3) 3

(2) $\sqrt{3}$ (4) $\frac{1}{\sqrt[3]{3}}$

12 Which expression is equivalent to the complex fraction $\dfrac{\dfrac{x}{x+2}}{1-\dfrac{x}{x+2}}$?

(1) $\dfrac{2}{x}$ (3) $\dfrac{2x}{x+2}$

(2) $\dfrac{x}{2}$ (4) $\dfrac{2x}{x^2+4}$

13 A used car was purchased in July 1999 for $11,900. If the car depreciates 13% of its value each year, what is the value of the car, to the *nearest hundred dollars*, in July 2002?

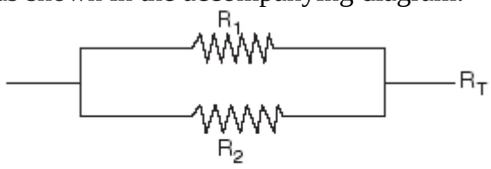
14 The Franklins inherited $3,500, which they want to invest for their child's future college expenses. If they invest it at 8.25% with interest compounded monthly, determine the value of the account, in dollars, after 5 years. Use the formula $A = P(1+\frac{r}{n})^{nt}$, where A = value of the investment after t years, P = principal invested, r = annual interest rate, and n = number of times compounded per year.

15 The cost (C) of selling x calculators in a store is modeled by the equation $C = \dfrac{3{,}200{,}000}{x} + 60{,}000$. The store profit ($P$) for these sales is modeled by the equation $P = 500x$. What is the minimum number of calculators that have to be sold for profit to be greater than cost?

16 A rock is thrown vertically from the ground with a velocity of 24 meters per second, and it reaches a height of $2 + 24t - 4.9t^2$ after t seconds. How many seconds after the rock is thrown will it reach maximum height, and what is the maximum height the rock will reach, in meters? How many seconds after the rock is thrown will it hit the ground? Round your answers to the *nearest hundredth*. Solve algebraicly.

17 Carmen and Jamal are standing 5,280 feet apart on a straight, horizontal road. They observe a hot-air balloon between them directly above the road. The angle of elevation from Carmen is 60° and from Jamal is 75°. Draw a diagram to illustrate this situation and find the height of the balloon to the *nearest foot.*

18 Electrical circuits can be connected in series, one after another, or in parallel circuits that branch off a main line. If circuits are hooked up in parallel, the reciprocal of the total resistance in the series is found by adding the reciprocals of each resistance, as shown in the accompanying diagram.



$$\frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{R_T}$$

If $R_1 = x$, $R_2 = x + 3$, and the total resistance, R_T, is 2.25 ohms, find the positive value of R_1 to the *nearest tenth of an ohm.*