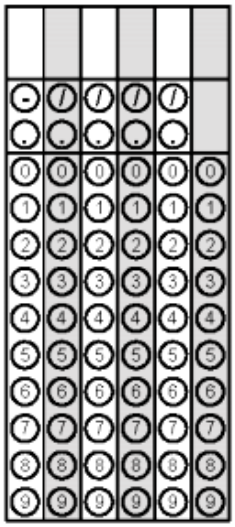
Math 3 - Midterm Review Name _____

Questions 1 through 5 are gridded response items that require you to write your answers in the boxes provided on your answer sheet. Write only one number of symbol in each box and fill in the circle in each column that matches what you have printed. Fill in only one circle in each column.

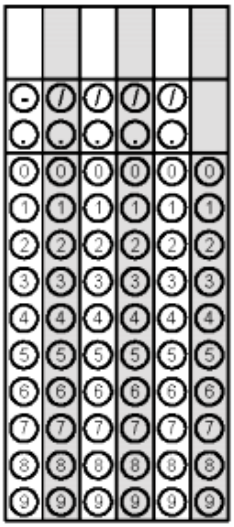
1) What is the remainder when $x^3 - 1$ is divided by $(x + 2)$?



2) The function below, $f(x)$, has $(x - 7)$ and $(x + 4i)$ as factors.

$f(x) = 2x^5 - 13x^4 + 22x^3 - 187x^2 - 160x + 336$

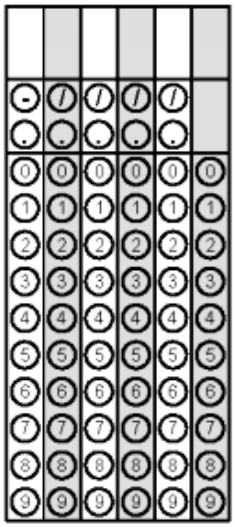
What is the total number of real zeros of $f(x)$?



3) Two functions are shown below.

$$f(x) = 2x^3 + 2x - 3$$
$$g(x) = -0.5|x - 4|$$

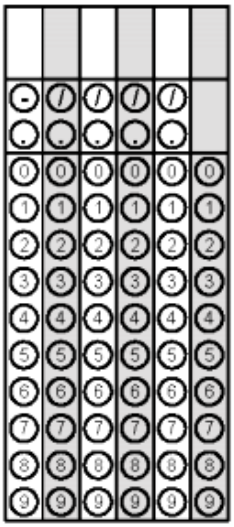
What is the y-value when $f(x) = g(x)$?



4) A function is shown below.

$$h(x) = \begin{cases} -\frac{1}{2}x - 15 \text{ for } x \leq -4 \\ 20 - 3x^2 \text{ for } x > -4 \end{cases}$$

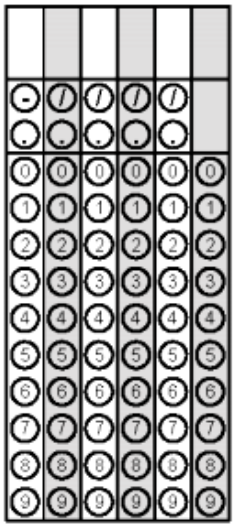
What is the value of $h(-4) + 3h(-2)$?



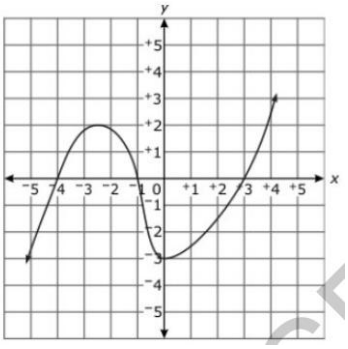
5) A function is shown below.

$$H(x) = 4x^3 - 5x^2 - 23x + 6$$

What is the distance, to the nearest hundredth of a unit, between the two zeros that are closest to each other?



6) The graph of a function is shown below.



Place each interval into the column that describes the function on that interval.

Decreasing	Increasing	Positive	Negative

(-4, -1)	**[-2, 0)**	**(0, 2]**	**(0, 4]**

7) The graph of the function $m(x) = x^3 + 3x^2 - 2x - 4$ has a zero at -1. What are the other zeros of the function?

A -2 and 2

B -1 and 4

C $-1 \pm \sqrt{5}$

D $1 \pm 5\sqrt{2}$

8) If $f(x) = k(x-2)^4$, where k is positive, what is the effect on the graph of $f(x)$ as k increases?

A The graph of f(x) is shifted up.

B The graph of f(x) is shifted down.

C The graph of f(x) is stretched vertically.

D The graph of f(x) is stretched horizontally.

9) The vertices of a triangle are at (0, 0), (6, 6), and (9, 3). What is the volume, in cubic units, of the figure created by rotating the triangle about y = x?

A $54\sqrt{2}$

B $324\sqrt{2}$

C $36\pi\sqrt{2}$

D $108\pi\sqrt{2}$

10) Which choice is equivalent to the expression shown below?

$$48x^3 - 243xy^2$$

A $3(4x^2 - 9y)(4x^2 - 9y)$

B $3(4x^2 - 9y)(4x^2 + 9y)$

C $3x(4x - 9y)(4x - 9y)$

D $3x(4x - 9y)(4x + 9y)$

11) A polynomial, $p(x)$, has a lead coefficient of 1 and

12) A company makes and boxes spaghetti.

exactly three distinct zeros.

- $x = -1$ is a zero of multiplicity two
- $x = 2$ is a zero of multiplicity one
- $x = 4$ is a zero of multiplicity one

What choice shows $p(x)$?

A $p(x) = x^3 - 5x^2 + 2x + 8$

B $p(x) = x^3 + 5x^2 + 2x - 8$

C $p(x) = x^4 - 4x^3 - 3x^2 + 10x + 8$

D $p(x) = x^4 + 4x^3 - 3x^2 - 10x + 8$

- One machine fills each box with approximately 32 ounces of spaghetti.
- After the boxes are filled, another machine weighs each box.
- A box is discarded if the weight of the box differs by more than 0.25 ounce from the target weight of 32 ounces.

Which inequality can be used to find the range of acceptable weights, x, of the spaghetti?

A $|x - 0.25| \leq 32$

B $|x + 0.25| \leq 32$

C $|x - 32| \leq 0.25$

D $|x + 32| \leq 0.25$

13) Two piecewise functions are shown below.

$$h(x) = \begin{cases} -3x \text{ for } x < 2 \\ 4x + 1 \text{ for } x \geq 2 \end{cases}$$

$$g(x) = \begin{cases} x^2 + 2 \text{ for } x < 3 \\ x^3 \text{ for } x \geq 3 \end{cases}$$

What is the value of $3h(2) + 4g(1)$?

A 39

B 28

C 10

D -6

14) An equation is show below.

$$9^{-3x+2} = 48$$

What is the value of x to the nearest ten-thousandth?

A 0.0794

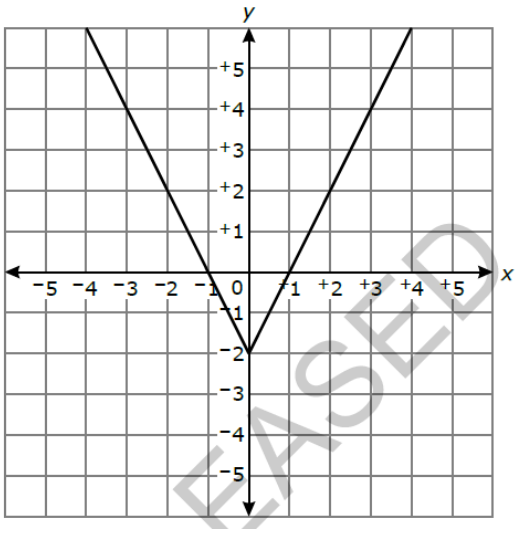
B 0.0995

C 0.4243

D 0.4774

15) The graph of an equation is shown below.

16) David plans to cover the floor of his room with new



Which equation represents the graph?

A $y = |x| - 2$

B $y = |2x| - 2$

C $y = |x - 2|$

D $y = |2x - 2|$

17) What is the length of the radius of the circle represented by the equation $x^2 + y^2 - 4x - 4y + 4 = 0$?

A 2 units

B 4 units

C 8 units

D 16 units

material.

- The floor is an isosceles trapezoid whose bases are 16 feet and 26 feet and sides are 13 feet in length.
- Each piece of new materical has an area of 2.5 square feet.

Assuming the pieces of new material can be cut as needed, how many pieces does David need?

A 101

B 126

C 202

D 252