

Show all work for partial credit. Please write on the test. The use of scratch paper is allowed but must be numbered accordingly and attached to the test. Good luck!

1. $f(x) = 3x^4 - x + 8$

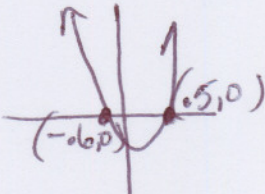
2 each

- a. State the degree of the polynomial. 4
- b. State the coefficient of the first term. 3
- c. State the degree of the first term. 4
- d. State the coefficient of the second term. -1
- e. State the degree of the second term. 1
- f. State the coefficient of the third term. 8
- g. State the degree of the third term. 0

9

2. Solve by **factoring method.** $10x^2 + x - 3 = 0$
 $(5x + 3)(2x - 1) = 0$
 $5x + 3 = 0 \quad 2x - 1 = 0$
 $x = -\frac{3}{5} \quad x = \frac{1}{2}$

9

3. Solve by **graphing method.** $10x^2 + x - 3 = 0$
 $y_1 = 10x^2 + x - 3$
 $y_2 = 0$

 $x = 0.5, -0.6$

9

4. Solve by **extraction of roots method.** $(x+1)^2 - 3 = 0$
 $\sqrt{(x+1)^2} = \sqrt{3}$
 $x+1 = \pm\sqrt{3}$
 $x = -1 \pm \sqrt{3} \approx 0.732, -2.732$

5. Solve by **quadratic formula method.** $10x^2 + x - 3 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 10 \quad b = 1 \quad c = -3$$

$$x = \frac{-1 \pm \sqrt{1^2 - 4(10)(-3)}}{2(10)}$$

$$x = \frac{-1 \pm \sqrt{1 + 120}}{20}$$

$$x = \frac{-1 \pm \sqrt{121}}{20} = \frac{-1 \pm 11}{20} = \frac{-1 + 11}{20} = \frac{10}{20}$$

$$= \frac{-1 - 11}{20} = \frac{-12}{20}$$

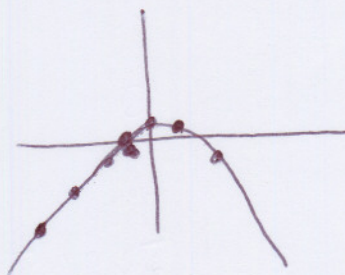
$$x = \frac{1}{2}, \frac{-3}{5}$$

9

6. From the given table, determine each of the following.

| input | output |
|-------|--------|
| -4 | -14 |
| -3 | -7 |
| -2 | -2 |
| -1 | 1 |
| 0 | 2 |
| 1 | 1 |
| 2 | -2 |

vertex



a. State the y-intercept.

$$(0, 2)$$

b. State the vertex.

$$(0, 2)$$

c. State the axis of symmetry.

$$x = 0$$

d. If we knew the quadratic equation $y = ax^2 + bx + c$ for the table, would we find the "a" value to be positive or negative?

Negative since parabola opens down

7. Factor $64x^3 - 1$

$$(4x)^3 - (1)^3 = (4x - 1)(16x^2 + 4x + 1)$$

S O P S

9

8. A metal ball is dropped from 4 feet above the ground.

a. Use $d(t) = h - 16t^2$ to find the equation that represents the ball's height above the ground after t seconds.

$$d(t) = 4 - 16t^2$$

4

b. When will the ball hit the ground?

$$0 = 4 - 16t^2 \quad \text{OR}$$

$$16t^2 = 4$$

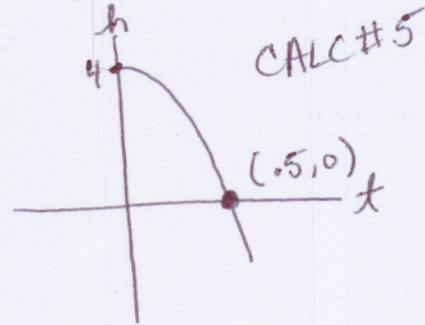
$$\sqrt{t^2} = \sqrt{\frac{4}{16}}$$

$$t = \pm \frac{2}{4} = \pm \frac{1}{2}$$

$$t = \frac{1}{2} \text{ sec}$$

$$y_1 = 4 - 16x^2$$

$$y_2 = 0$$



4

9. The polynomial $f(x) = 1.5x^2 - 29.833x + 200$ models an athlete's heart rate x minutes after exercise has stopped where $0 \leq x \leq 8$. Make a table of the function starting at $x = 0$, incrementing by 1. Find x such that $75 < f(x) < 124$.

$$f(x) = 1.5x^2 - 29.833x + 200$$

| x | f(x) |
|---|--------|
| 0 | 200 |
| 1 | 171.67 |
| 2 | 146.33 |
| 3 | 124 |
| 4 | 104.67 |
| 5 | 88.335 |
| 6 | 75.002 |
| 7 | 64.669 |
| 8 | 57.336 |

$$3 \leq x \leq 6$$

8

10. Solve by an appropriate method of your choice. Show your work.

$$3x^3 + 2x^2 - 75x - 50 = 0$$

$$x^2(3x+2) - 25(3x+2) = 0$$

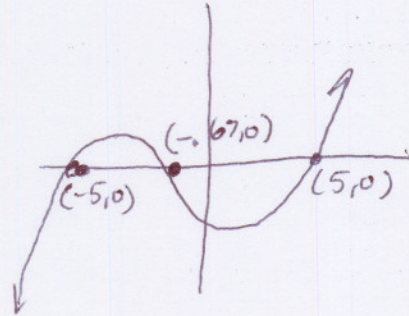
$$(3x+2)(x^2-25) = 0$$

$$(3x+2)(x+5)(x-5) = 0$$

$$3x+2=0 \quad x+5=0 \quad x-5=0$$

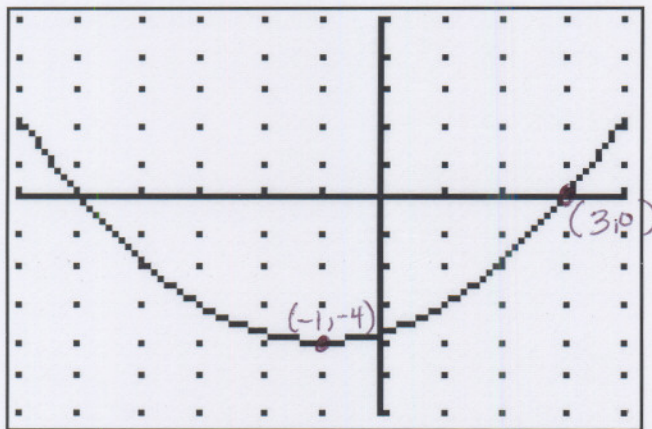
$$x = -\frac{2}{3} \quad x = -5 \quad x = 5$$

or $y_1 = 3x^3 + 2x^2 - 75x - 50$
 $y_2 = 0$



8

11. Use the graph to evaluate the following. Each tick mark represents one unit.



4 $f(3) = \boxed{0}$

4 $f(-1) = \boxed{-4}$