

NAME	INSTRUCTOR	SCORE	/100
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Point-values are shown at right in parentheses.

I. SIMPLIFY AS MUCH AS POSSIBLE.

SHOW APPROPRIATE WORK.

1. $\sqrt[5]{32a^{20}b^{17}}$ (Answer using radical notation.) 1. _____ (3)

2. $\left(\frac{16n^{-2}}{2n^4}\right)^{1/3}$ (Answer using positive exponents only.) 2. _____ (3)

3. $4\log_b(x^2) + \log_b(2x)$ (Answer as a single logarithm with a coefficient of 1). 3. _____ (3)

4. $\frac{k^2 - 9}{2k^2 - k - 10} \div \frac{k^2 + 4k - 21}{2k - 5}$ 4. _____ (3)

5. $\frac{t}{2t+1} - \frac{2}{t-2}$ 5. _____ (3)

6. $(2x + y)(5x^2 - 3xy + 4y^2)$ 6. _____ (3)

7. $4(\sqrt{4a} - 7) + 4(7 - \sqrt{a})$ 7. _____ (3)

II. SOLVE AS INDICATED.

SHOW APPROPRIATE WORK.

8. Find the exact solutions in the simplest form: $(x-1)^2 = 5$. (Answer using radical notation.)

8. _____ (3)

9. Solve for r : $P = \frac{A}{1+rt}$

9. _____ (3)

10. Solve for x : $\sqrt{x^3 - 3} = 2$ (Round to the second decimal place.)

10. _____ (3)

11. Solve for p : $4\log_3(7p+5) - 6 = 2$

11. _____ (3)

12. Solve for x : $(5)^{3x-1} = 27$. (Round to the fourth decimal place.)

12. _____ (3)

13. For the function $f(x) = \sqrt{x-2} + 5$:

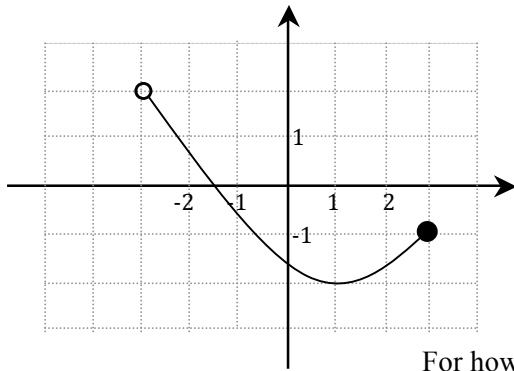
(a) Find $f(11)$.

(a) _____ (2)

(b) For what value of x is $f(x) = 8$?

(b) _____ (2)

14. Use the graph of the function $y = F(x)$ below.



$F(1) =$ _____ (2)

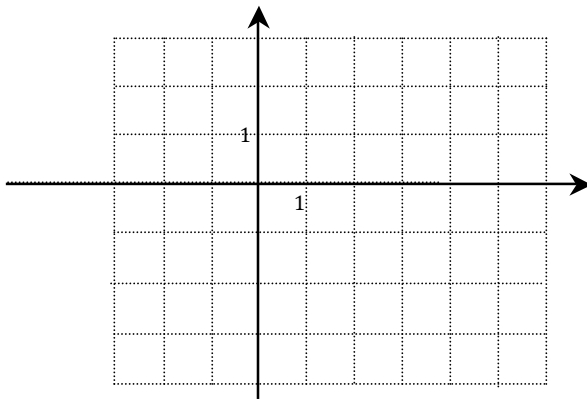
Domain _____ (2)

Range _____ (2)

For how many values of x does $F(x) = -1$? _____ (2)

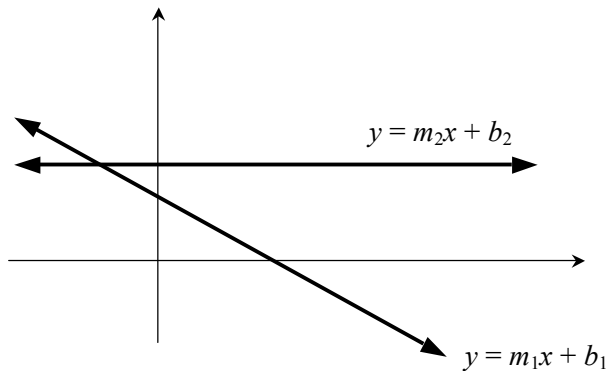
15. (a) Graph $y = 2^x - 3$ and $y = -\frac{2}{5}x + 2$ below. (4)

(b) Find the intersection point as an ordered pair using the graphing calculator.
Round your answer to the third decimal place.



(b) (_____ , _____) (3)

16. Graphs of the equations $y = m_1x + b_1$ and $y = m_2x + b_2$ are sketched.



(a) Which is greater, m_1 or m_2 ?
_____ (2)

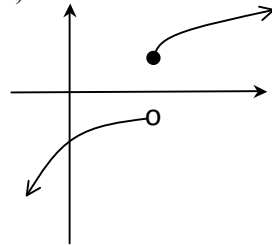
(b) Which is greater, b_1 or b_2 ?
_____ (2)

17. Which of the following are representations of functions?

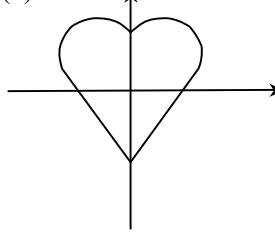
(a)

x	y
-3	0
-1	3
2	1
4	1

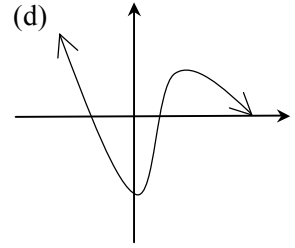
(b)



(c)



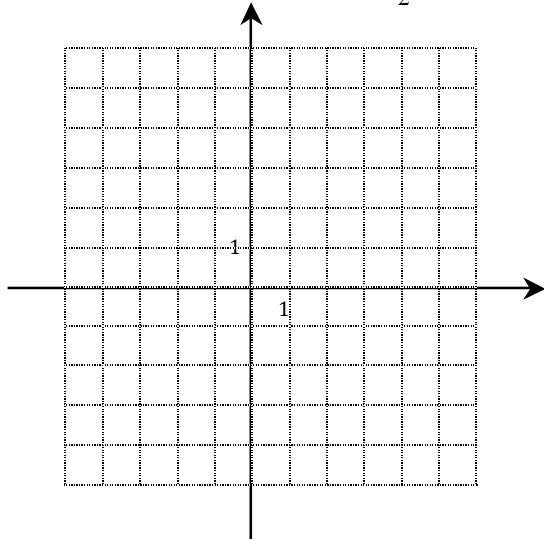
(d)



17. _____ (3)

18. (a) Sketch the graph $f(x) = \frac{1}{2}(x-2)^2 - 3$ below.

(3)



(b) Write the vertex as an ordered pair.

(_____ , _____) (2)

(c) Find the y-intercept.

(_____ , _____) (2)

III. APPLICATIONS

19. Ski run A declines steadily for 85 yards over a horizontal distance of 270 yards. Ski run B declines steadily for 140 yards over a horizontal distance of 475 yards. Which run is steeper?

19. _____ (3)

20. A car is traveling at speed s (in mph) on a dry asphalt road, and the brakes are suddenly applied. The stopping distance d (in feet) varies *directly as the square of the speed s* . If a car traveling at 60mph can stop in 180 feet, what is *the stopping distance* of a car traveling at 70 mph?

20. _____ (4)
(Include units)

21. The percentages of US teenagers with driver’s licenses are shown in the table.

Age (years)	Percent(%)
16	56.8
17	63.3
18	69.8
19	76.3

Let $P(t)$ be the percentage of teenagers at age t years who have driver’s licenses.

(a) Find a linear equation of P in terms of t .

(a) $P(t) =$ _____ (3)

(b) Write a sentence using number and units to describe the meaning of the slope in this situation.

_____ (2)

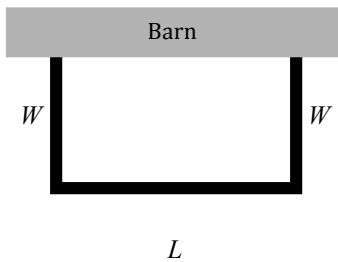
(c) Estimate the percentage of 21-year-old adults who have driver’s licenses.

(c) _____ % (3)

22. A farmer plans to use 180 feet of fencing and a side of his barn to enclose a rectangular garden.

(a) What should be the dimensions of the rectangle so that the area is as large as possible?

(b) What is the **maximum area**?



(a) $L =$ _____
(Include units)

$W =$ _____ (4)
(Include units)

(b) _____ (2)
(Include units)

23. On March 1, there are 400 leaves on a tree. For a while, the total number of leaves triples each week. Let $f(t)$ be the total number of leaves on the tree at t weeks since March 1.

(a) Find an equation of f in terms of t .

(a) $f(t) =$ _____ (3)

(b) How long does it take to have 3,600 for the total number of leaves? (Show work!)

(b) _____ (3)
(Include units)

24. The number of Americans with personal computers (in millions) can be modeled by

$C(t) = 4.13t + 57.93$, where t is the number of years since 1990.

U.S. population (in millions) model at t years since 1990 is $U(t) = 0.068t^2 + 2.58t + 251.9$.

Let $P(t)$ be the percentage of Americans who has personal computers at t years since 1990.

Then $P(t)$ can be expressed as $P(t) = \left(\frac{4.13t + 57.93}{0.068t^2 + 2.58t + 251.9} \right) \cdot 100$.

Find $P(22)$ rounding to the second decimal place.

Write a sentence using percentage and year to describe the meaning of $P(22)$ in this situation.

$P(22) =$ _____ (2)

 _____ (2)