Math 372
Summer 2025
Exam 2, July 14

No books, notes, scratch paper, phones.
Please show all your work and clearly mark your answers.
Problems are 10 points each except as noted.
If a problem is too hard, move on to an easier one.
No Calculators on problems 1-9.

Page	Pts	Possible
1		25
2		22
3		28
4		15
5		10
Total		100

Name (printed): _____Key_____

Name (signature): _____

Score for the
class so far: _____ out of _____ points

Percent: _____ %   Approximate letter grade:

To earn a grade of _____ I would need about _____
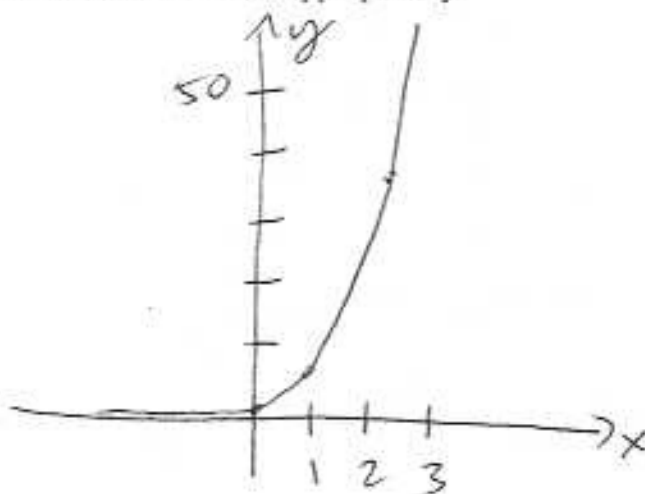of the points in the rest of the class.

1) Simplify:

a) $(x^2)^5$

x^{10}

b) $\frac{\sqrt{x}}{\sqrt[6]{x}}$ $x^{\frac{1}{2}-\frac{1}{6}} = x^{\frac{1}{3}} = \sqrt[3]{x}$

c) $\sqrt[3]{x^{12}}$ $\left(x^{12}\right)^{\frac{1}{3}} = x^4$
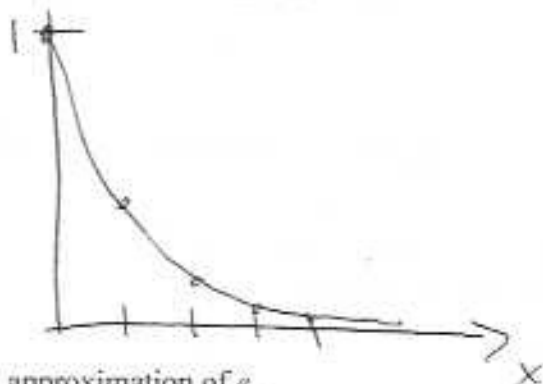
2) Graph

a) $y = 6^x$

Scale the y-axis from 0 to 50. Scale x appropriately.

b) $y = \left(\frac{1}{3}\right)^x$

Scale the x-axis from 0 to 4. Scale y appropriately.

3) Give a numerical approximation of e.   (5 pts)

2.718

4) Rewrite as a single log: (6 pts)

$$2\ln(x) + 3\ln(y) - \frac{1}{2}\ln(11)$$

$$\ln(x^2) + \ln(y^3) - \ln(\sqrt{11})$$

$$\ln\left(\frac{x^2 y^3}{\sqrt{11}}\right)$$

5) Find all solutions of:

$$\left(x^2 \cdot \frac{-1}{2\sqrt{10-x}} + 2x\sqrt{10-x} \;=\; 0 \right) \sqrt{10-x}$$

on the interval (0, 10).

$$\left(-\frac{x^2}{2} + 2x(10-x) = 0 \right) 2 \qquad \rightarrow 40 - 5x = 0$$

$$-x^2 + 4x(10-x) = 0 \qquad \boxed{x = 8}$$

$$-x^2 + 40x - 4x^2 = 0$$

$$40x - 5x^2 = 0$$

6) Evaluate: (6 pts)

a) $\log_{10}(0.0001)$

$$-4$$

b) $\log_2(2\sqrt{2})$

$$2 \cdot 2^{\frac{1}{2}} = 2^{\frac{3}{2}} \qquad \boxed{\text{Ans: } \frac{3}{2}}$$

One more page

7a) Rewrite with no root symbol and no fraction: (8 pts)

$$\frac{1}{\sqrt[4]{(x-5)^3}}$$

$$\left(x-5\right)^{-\frac{3}{4}}$$

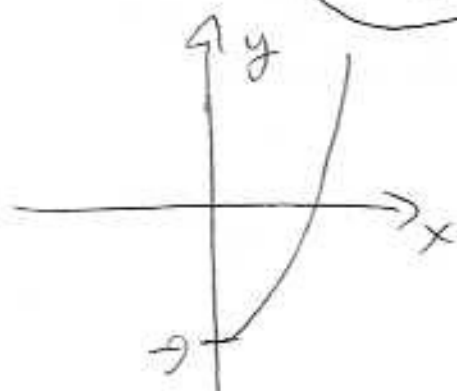b) Calculate $(100)^{-3/2}$. Hint: Rewrite with root symbol and fraction.

$$\frac{1}{100^{\frac{3}{2}}}$$

$$\frac{1}{\left(\sqrt{100}\right)^3} = \frac{1}{10^3} = \frac{1}{1000}$$

8) The function $f(x) = x^2 - 9$, on the interval $[0, \infty)$
a) Find the range.

$$[-9, \infty)$$

b) Find the inverse function of f.
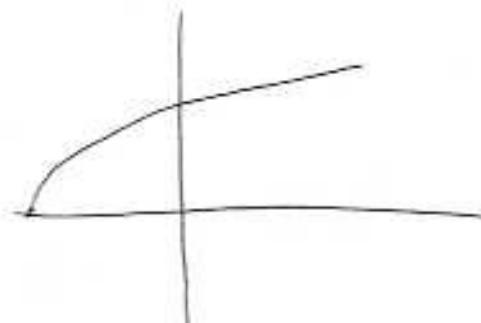
$$y = x^2 - 9$$
$$x = y^2 - 9$$
$$x + 9 = y^2$$
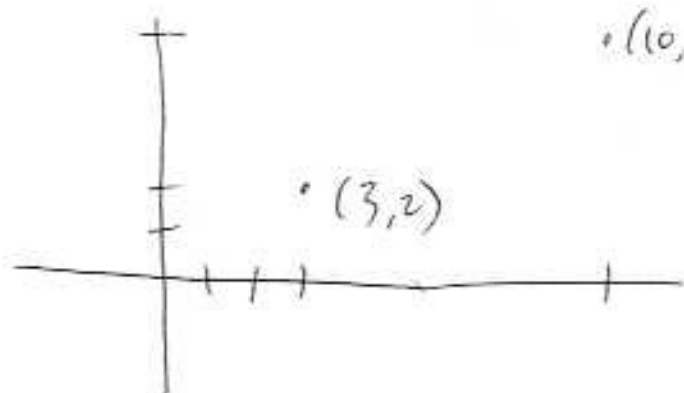
$$y = \sqrt{x+9}$$

$$g(x) = \sqrt{x+9}$$

c) Find the domain and range of this inverse function.

Domain: $[-9, \infty)$

Range: $[0, \infty)$

9) Find the equation of the line that goes through $(3, 2)$ and $(10, 7)$. Write your answer as a function: $f(x) = \ldots$

$\cdot (10, 7)$ $m = \frac{5}{7}$

$\cdot (3, 2)$

$$y - 2 = \frac{5}{7}(x - 3)$$

$$y = \frac{5}{7}x - \frac{15}{7} + \frac{14}{7}$$

$$f(x) = \frac{5}{7}x - \frac{1}{7}$$

A) Find the amount of money obtained by investing $8,000 at 4.8% annual interest, compounded monthly, for 3 years.   (6 pts)

$$8000\left(1 + \frac{0.048}{12}\right)^{36}$$

$$\boxed{\$9236.42}$$

B) Solve and write to at least 3 decimal places.
a) $\ln(x) = 3.89$ (9 pts)

$$48.911$$

b) $\log_3(103.9) = x$

$$4.227$$

c) $8^x = 0.229$

$$-0.709$$

One more on back

C) The value of a car is $44,000 when it is new. After 10 years, the value is $12,500.
a) Write a model of the form:
$$V(t) = Ae^{kt}$$
by solving for A and k.
b) When will the car be worth $23,000?
c) What is the rate of change of value when the car is purchased?

$$V(t) = 44000\, e^{kt}$$

$$12500 = 44000\, e^{10k}$$

$$k = -.1258$$

a) $$V(t) = 44000\, e^{-.1258t}$$

b) 5.16 years

c) $-$5535 per year