Math 372
Fall 2025
Exam 2, October 30

No books, notes, scratch paper, phones.
Please show all your work and clearly mark your answers.
Problems are 8 points unless noted.
If a problem is too hard, move on to an easier one.
No calculators.

Page	Pts	Possible
1		20
2		16
3		16
4		28
5		20
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.

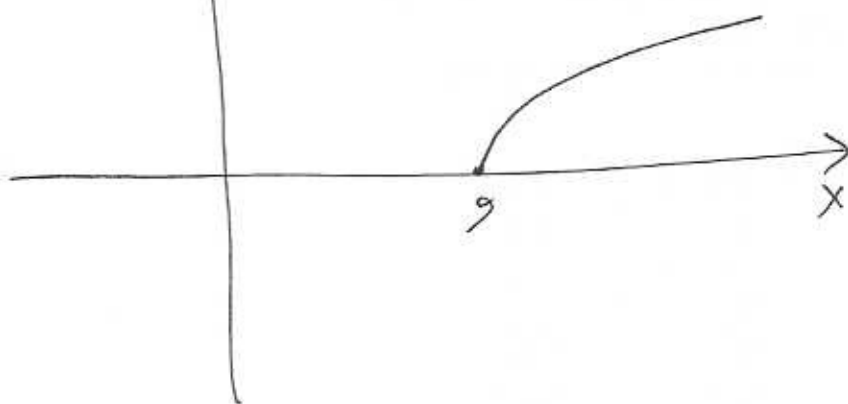1a) Find the domain of $f(x) = \sqrt{x - 9}$.   (12 points)
b) Graph $y = f(x)$
c) Find the domain of $g(x) = \sqrt{9 - x}$.
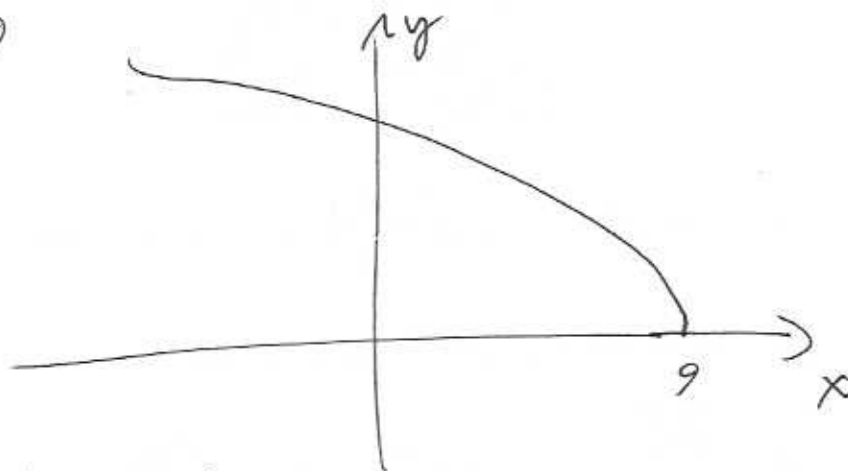d) Graph $y = g(x)$

a) $x \geqslant 9$

b)

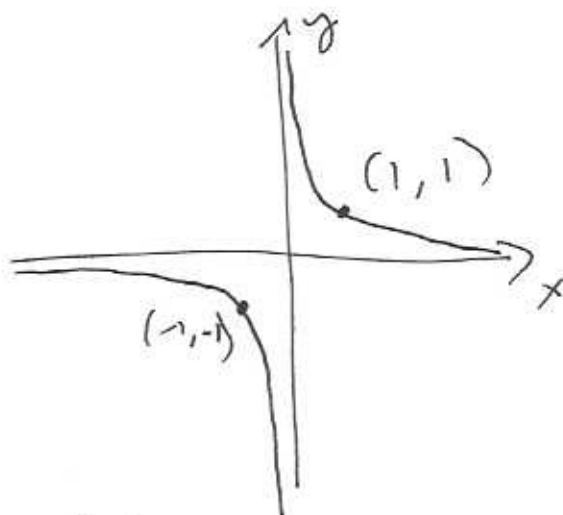c) $x \leq 9$

d)

2) Find the diagonal asymptote of

$$g(x) = \frac{2x^2 + 5x - 8}{x - 2}$$

2) 2   5 -8 $y = 2x + 9$
         4   18
    2   9 $+10$

3) Graph…

a) $f(x) = \dfrac{1}{x^3}$
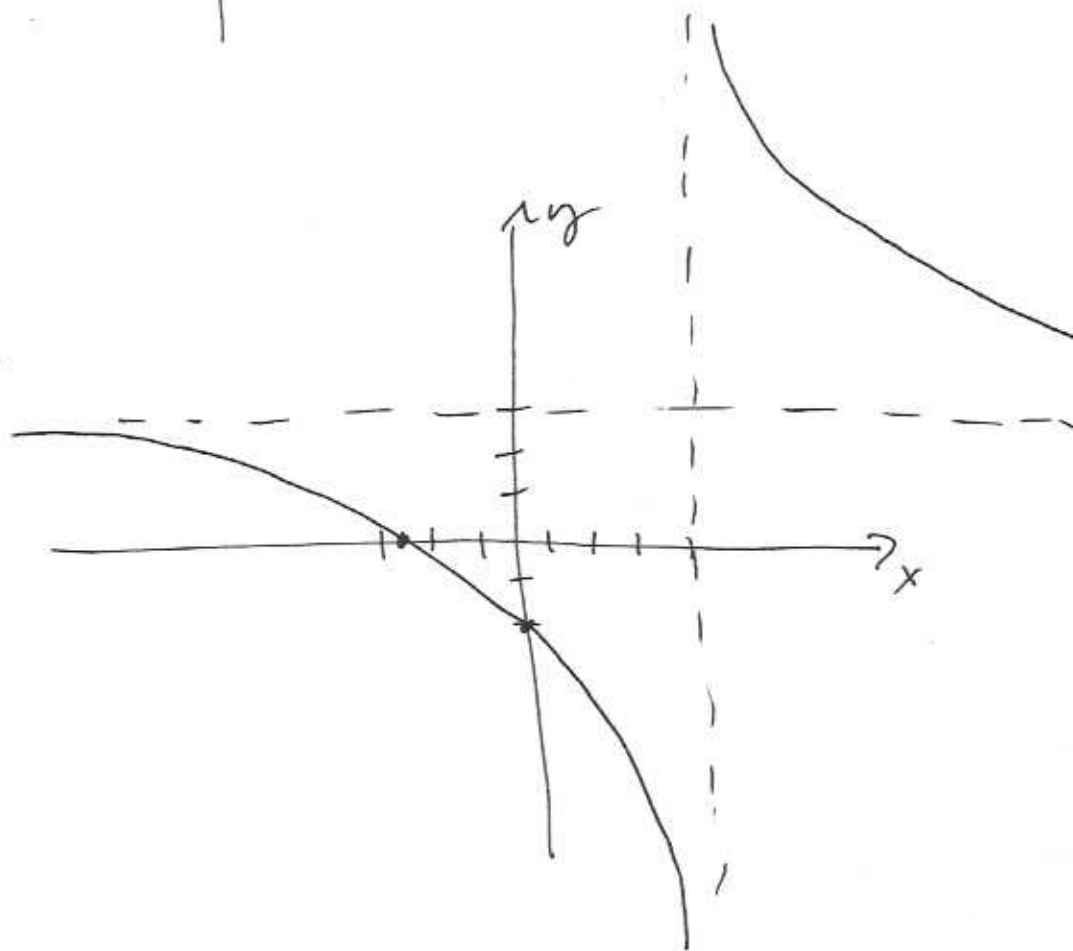

$(1, 1)$

$(-1, -1)$

b) $g(x) = x^{2/5}$
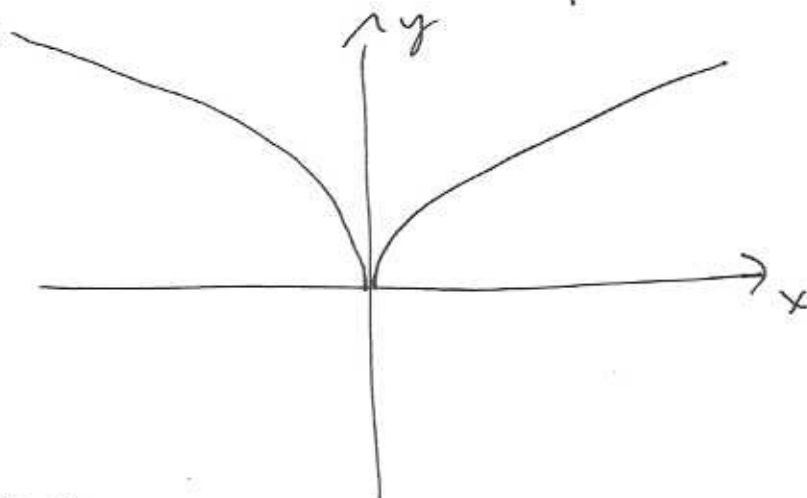
4) Graph $y = \dfrac{3x+8}{x-4}$
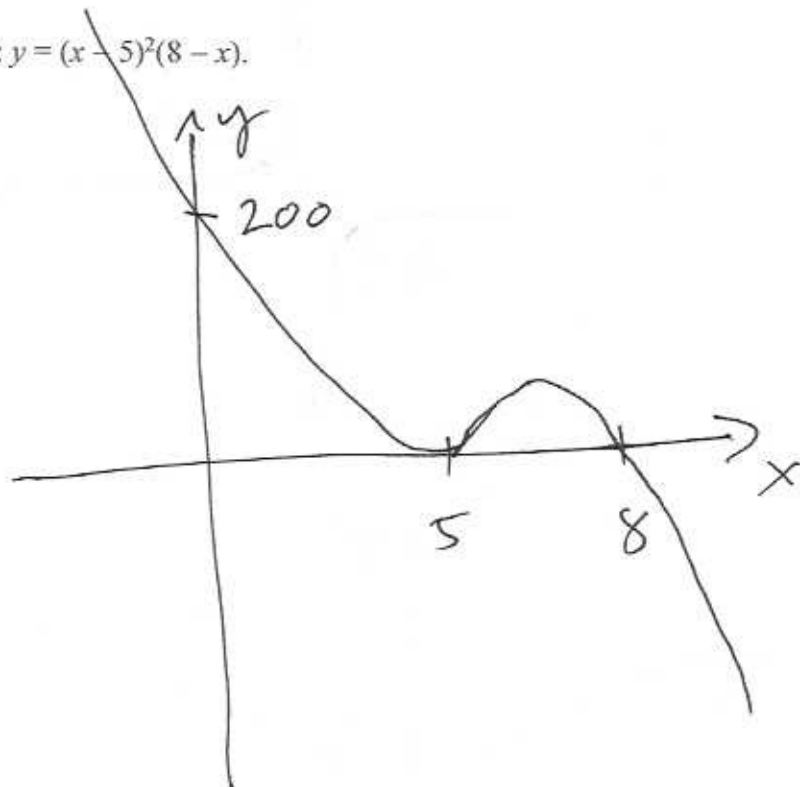
HA: $y = 3$

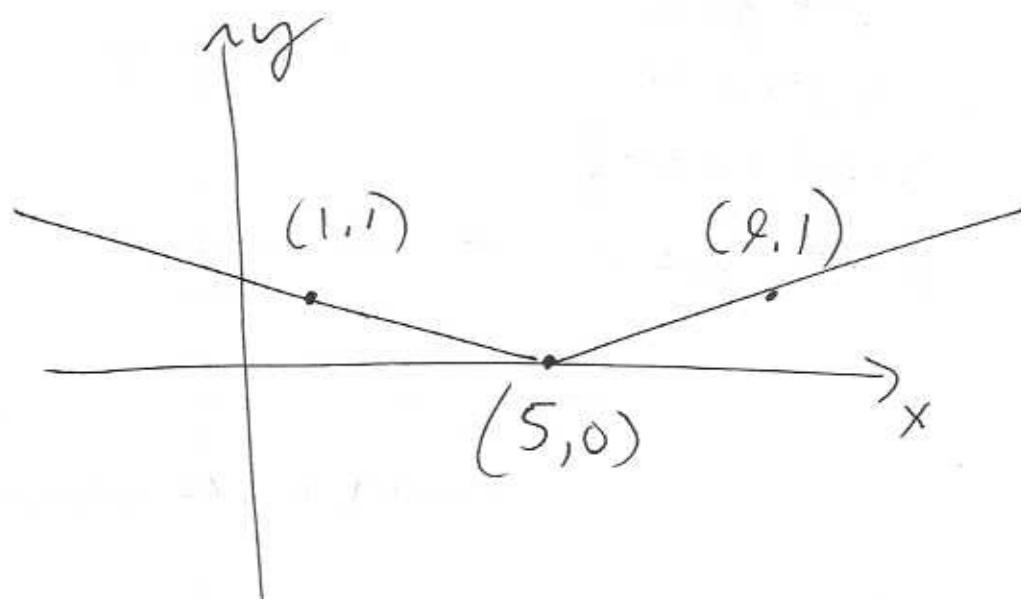VA: $x = 4$

x-int: $x = -\dfrac{8}{3}$

y-int: $y = -2$

5) Graph this polynomial: $y = (x - 5)^2(8 - x)$.

6) Graph $y = \dfrac{|x-5|}{4}$. Label at least two points on your graph.

7a) Rewrite so that x appears only once: $x^2(\sqrt[3]{x})$.

$$x^2 \cdot x^{\frac{1}{3}} = x^{\frac{7}{3}}$$

7b) Rewrite as 5 times a thing: $\dfrac{5}{\sqrt[4]{(x+3)^3}}$.

$$= 5(x+3)^{-\frac{3}{4}}$$

8a) Write the definition of "monomial." (12 points)

A number times x to a whole number power

+6

+6

b) Which of these is a monomial? Write YES or NO for each.

$4x^5$ Yes

$\dfrac{x}{7}$ Yes

$\dfrac{7}{x}$ No

$3\sqrt{x}$ No

-37 Yes

9) Similar to class on 10/23…
Suppose $g(x) = x(8-x)^{1/3}$. Using calculus, one finds that
$$g'(x) = x \cdot \frac{1}{3}(8-x)^{-2/3}(-1) + (8-x)^{1/3}$$

Solve $g'(x) = 0$, thus giving a potential x-location for a maximum of this function.
Hint: Rewrite $(8-x)^{1/3}$ as $(8-x)^{-2/3}$ times $(8-x)$ to another exponent. And then factor.

$$-\frac{x}{3}(8-x)^{-\frac{2}{3}} + (8-x)^{-\frac{2}{3}}(8-x) = 0$$

$$(8-x)^{-\frac{2}{3}}\left(-\frac{x}{3} + 8 - x\right) = 0$$

$\uparrow$

Never zero

$$-\frac{x}{3} - x + 8 = 0$$

$$8 = x + \frac{x}{3}$$

$$8 = \frac{4x}{3}$$

$$8 \cdot \frac{3}{4} = x$$

$$\boxed{x = 6}$$

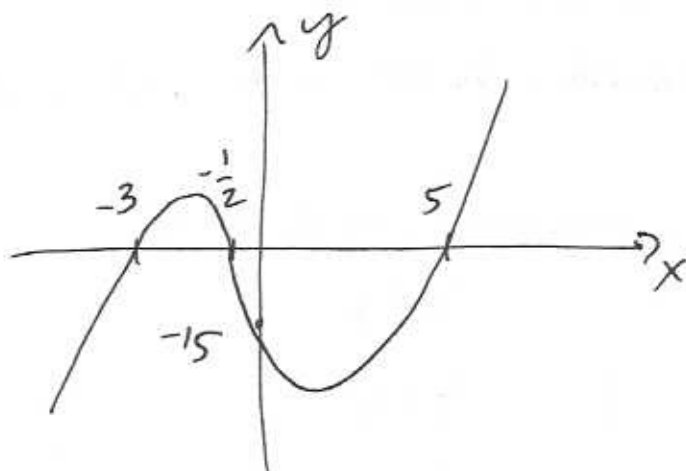10) Graph $f(x) = 2x^3 - 3x^2 - 32x - 15$. Hint: one x-intercept is $x = -3$.   (12 points)

$$-3 \overline{\smash{)}\ \begin{array}{cccc} 2 & -3 & -32 & -15 \end{array}}$$

$$\begin{array}{cccc} & -6 & 27 & 15 \\ \hline 2 & -9 & -5 & 0 \end{array}$$

$(2x^2 - 9x - 5)$

$(2x + 1)(x - 5)$

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

11) You have $h(x) = (x - 5)^2$.
a) Restrict the domain so that the function is one-to-one. Write this domain. Also, write the range.
b) Find the inverse function of h.
c) What are the domain and range of your inverse function?

a) Use $[5, \infty)$
   Range $[0, \infty)$

c) Domain $[0, \infty)$
   Range $[5, \infty)$

b) $x = (y - 5)^2$

$\sqrt{x} = y - 5$

$y = 5 + \sqrt{x}$

$\boxed{h(x) = \sqrt{x} + 5}$