

Your exam will consist of two parts. Part I (40 points) will have 8 multiple choice questions, with only your answer counting. The questions will be similar to the ones listed in part I below. Part II (60 points) will have 6 problems like the ones in Part II below, in which you must show all your work to receive credit. Partial credit will be possible.

Part I

2.1 If $f(x) = 3x^2 - 2x$ then $f(5) = ??$.

2.2 The domain of the function $f(x) = 2 - \frac{1}{x}$ is ??.

2.3 The function

$$f(x) = \begin{cases} x^2 & \text{for } -2 \leq x \leq 1 \\ 2 - x & \text{for } 1 \leq x \leq 4 \\ 4 & \text{for } -4 \leq -x < -2 \end{cases}$$

is decreasing on the interval ??.

2.4 The number of zeros that the function $f(x) = x^3 - 3x - 1$ has is ??.

2.5 The slope of the line with equation $4x - 6y = 7$ is ??.

2.6 An equation for the line through the point $(1,2)$ which is parallel to the line with equation $y - 2 = 3(x - 5)$ is ??.

2.7 An equation for a circle of radius 4 with center $(3,6)$ is ??.

2.8 The function $f(x) = x^2 - x$ is (odd, even, neither)?.

2.9 If $f(x) = x^2 + 1$ and $g(x) = x + 7$ then $f \circ g(w) - g \circ f(w) = ??$

2.10 The graph of $xy = -3$ is symmetric with respect to (the x -axis?, the y -axis?, the origin?).

2.11 $\sqrt{-25} + \sqrt{-49}$ expressed in terms of i is ??.

2.12 The coordinates of the vertex of the parabola $y = 2x^2 + 3x + 1$ are ??.

2.13 The solution(s) of the equation $x^2 + x + 1 = 0$ are ??.

2.14 An expanded and simplified expression for $(x^2 + x - 1)(x^3 - x + 4)$ is ??.

Part II

SHOW ALL YOUR WORK TO RECEIVE CREDIT FOR THE 6 PROBLEMS IN THIS PART.

2.15 If $f(x) = 6x^2 - 1$ find $\frac{f(a+h)-f(a)}{h}$ and express your answer in the simplest form you can.

2.16 Express each of the following functions as a composition of two simpler functions

a) $f(x) = (x^2 + 3)^4 - 1$ b) $g(x) = \frac{1}{(3x+7)^2}$

2.17 A taxicab ride costs \$1.23 per mile plus an initial charge of \$2.00. a) Express the cost of a taxicab ride as a function of the distance d you travel. b) Suppose that the taxicab always travels at 20 miles per hour. Express the cost of a taxicab ride as a function of the time t that the ride takes.

2.18 Each of the following table gives input-output values for a function. Determine if the function could be linear and if so, find a formula for v in terms of t . a)

| | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|
| t | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| v | 2.0 | 2.7 | 3.0 | 3.5 | 4.0 | 4.3 | 5.0 |

b)

| | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|
| t | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| v | 2.0 | 2.3 | 2.6 | 2.9 | 3.2 | 3.5 | 3.8 |

2.19 Find an equation for the circle whose diameter is the line segment joining the points $(-1,2)$ and $(5,10)$.

2.20 Find a function g whose graph has the shape of the graph of $f(x) = |x|$ but shifted 6 units up and 4 units to the left. Sketch a graph of your function g .

2.21 Sketch a graph of the function

$$f(x) = \begin{cases} x + 1 & \text{for } -4 \leq x \leq 0 \\ |x - 1| & \text{for } 0 \leq x \leq 2 \\ 6 & \text{for } 2 < -x \leq 4 \end{cases}$$

2.22 Use long division to divide $x^3 + 3x + 10$ by $x - 2$. Find the quotient and remainder.

2.23 Factor completely: a) $a^2b + ab^2$ b) $ab + b$ c) $a^3 - 8$.