

Name _____ raw scaled percent

Math 11 Trimester 1 Practice Exam 1P (319 Points)

Nth roots, functions, exponential equations

- Partial credit may be given for correct work. Therefore, it is to your advantage to write clear solutions. If I cannot understand a solution within 90 seconds, then it will receive no partial credit.
- Answers must be completely simplified. No denominators may include radicals. All fractions reduced. Arithmetic must be completely performed; e.g. write 9 instead of $\sqrt{81}$.
- No calculators. All answers must be exact.

■ A. Simplify the following. (5 points each answer)

[1] $\sqrt[4]{5} \sqrt[4]{125}$

[2] $\sqrt[8]{a} \sqrt{a} \sqrt[8]{a^3}$

[3] $\sqrt[3]{8^5}$

■ B. Simplify the following. (5 points each answer)

[1] $(7^{-\frac{3}{4}} \cdot 7^{-1})^{-2} \cdot 7^{-\frac{7}{2}}$

[2] $(a\sqrt{2})^{-3} \cdot a\sqrt{18}$

[3] $(a^{\frac{3}{4}} a^{\frac{1}{2}})^{\frac{2}{5}}$

■ C. Answer the following. (6 points each answer)

- [1] Suppose $P(-3, 2)$ and Q are symmetric with respect to the y -axis. Then Q is the point (,)
- [2] Suppose $P(10, -9)$ and Q are symmetric with respect to the x -axis. Then Q is the point (,)
- [3] Let $P(-1, -3)$ and Q be symmetric with respect to the line $y = x$. Then Q is the point (,)
- [4] (Circle the best answer.) The graph of $f(x) = x^8$ is symmetric with respect to the
- (a) the x -axis.
 - (b) the y -axis.
 - (c) the origin.
 - (d) the line $y = x$.
 - (e) all of the above.

[5] (Circle the best answer.) The graph of $f(x) = x^2, x \in [0, \infty)$ is symmetric to

- (a) $g(x) = -x^2, x \in [0, \infty)$ with respect to the x -axis.
- (b) $h(x) = x^2, x \in (-\infty, 0]$ with respect to the y -axis.
- (c) $j(x) = -(x)^2, \in (-\infty, 0],$ with respect to the origin.
- (d) all of the above.

■ D. Answer the following. (13 points each answer)

- [1] If n is an even number, state the largest interval on which $f(x) = x^n$ is an increasing function of x .
- [2] If n is an odd number, state the largest interval on which $f(x) = x^n$ is an increasing function of x .
- [3] If n is an even number, state the two points that *must* be on the graph of $f : f(x) = x^n$.
- [4] If n is an odd number, state the two points that *must* be on the graph of $f : f(x) = x^n$.
- [5] For $f : f(x) = x^{10}$ and $g : g(x) = x^{11}$, give one solution of the equation $f(x) = g(x)$.

■ E. Answer the following. (16 points each answer)

[1] Prove that the operation of composition on the set of linear functions is not commutative.

[2] Functions f and g are defined by $f : f(x) = 2x + 1$ and $g : g(x) = x^2 - 1$.
Write $g \circ f$ in its simplest form.

[3] For f defined by $f : f(x) = x^{-1}$, $x \neq 0$, write $f \circ f \circ f$ in simplest form.

[4] Functions f and g are defined by $f : f(x) = \sqrt{x+1}$ and $g : g(x) = x + 2$.
Evaluate $f(g(x))$ at $x = 1$.

[5] Find functions f and g such that $f \circ g = h$, for $h : h(x) = (2x^2 + 3)^5$.

[6] State the domain and range of the function f defined by $f(x) = \sqrt{x}$.

■ F1. Find the inverse of each function and state its domain. (13 points each answer)

[1] $f : f(x) = 3x - 2$

[2] $f : f(x) = \sqrt{x}$, $x \in [0, \infty)$

[3] $g : g(x) = \frac{1+3x}{5-2x}$.

■ F2. Complete the following. (13 points each answer)

[1] Prove that $f : f(x) = 5x - 2$ is the inverse function of $g : g(x) = \frac{x+2}{5}$.

[2] Prove that the function defined by $g : g(x) = x^n$ has an inverse for all values of n in $\{3, 5, 7, 11, \dots\}$.

■ G. Solve the following. (11 points each answer)

[1] $7^{x^2} = 49^{6-2x}$

[2] $3^{x+1}(9^{2-x}) = \frac{1}{3}$

[3] $3(2^{x+1}) = 5(2^x) + 8$ (hint: $2^{x+1} = 2^x \cdot 2$)