

NAME:

1. [4] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F. Let f and g be functions, and x , y , and z be non-zero real numbers.

T F $-3^2 = 9$

T F $(x + 2)^2 = x^2 + 4$

T F $\frac{3}{\frac{1}{x}} = 3x$

T F All functions pass the vertical line test.

T F $f(x + y) = f(x) + f(y)$

T F $(f + g)(x) = f(x) + g(x)$

T F $\sqrt{2}x^2 + \pi x - 7$ is a polynomial.T F The volume of a sphere with radius r is $\frac{4}{3}\pi r^3$.

Show your work for the following problems. The correct answer with no supporting work will receive NO credit.

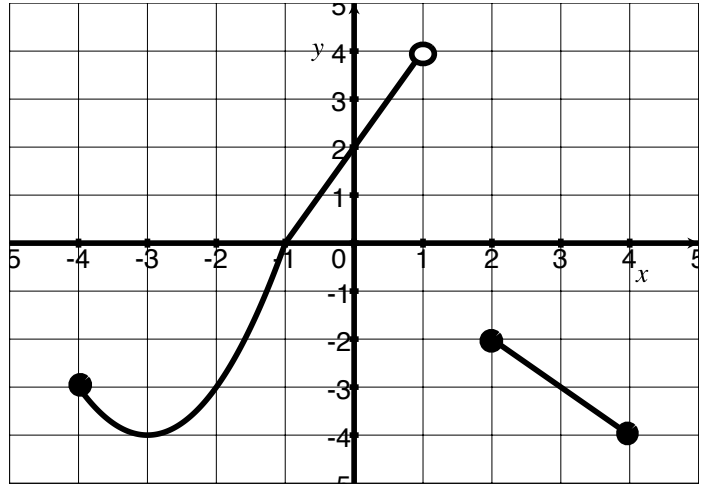
2. [3] (Exponent Wks #4) Find all x so that:

$$3x^{-2} - 7 = 0$$

3. The graph of a piece-wise defined function f is provided on the right.

(a) [1] (§1.2 #23) Estimate $f(-2)$.

(b) [2] (§1.2 #19) What is the domain of f ?



(c) [3] (§1.2 #43) Estimate all values x so that $f(x) = -2$.

(d) [2] (§1.3 #23) Let $n(x) = f(x - 1)$. Carefully draw the graph of n on the axes above.

4. [3] (Practice Exam \$4) Let $h(x) = \frac{x-2}{x}$. The function h is one-to-one, find h^{-1} .

5. The graph of the function g is a straight line with slope $\frac{1}{3}$ that passes through $(3,-1)$.
- (a) [2] (Line Wks #6) Find the rule of g .
- (b) [2] Find the rule of a line that is perpendicular to g . (There are many right answers.)
- (c) [2] (§2.1 # 31) Find the intersection in the xy plane of the line g and the line described by $y = 2x$.
6. [3] (WebHW5 #16) Find a degree four polynomial with -5 , 3 , and 2 as its *only* roots. (Note: there are many right answers here.)

7. [4] (§2.3 #31) Simplify the given expression

$$\frac{x(x^2y^{-5})^{-4}}{(x^5y^{-2})^{-3}y^2}$$

8. Let $m(x) = x^3 + x^2 - 14x + 6$ and $n(x) = x^2 + 4x - 2$.

(a) [3] Complete the square to find the vertex of n .

(b) [2] (Practice Exam #4) Find the rule for $n(z + \sqrt{2})$. Do *not* simplify.

(c) [2] (Practice Exam #4) Find the rule for $(m \circ n)(x)$. Do *not* simplify.

(d) [2] (Lecture 7/6) Write down the rule of $(m + n)(x)$. *Simplify*.

(e) [4] (Lecture 7/6) Is n a factor of m ? That is, does $x^2 + 4x - 2$ divide into $x^3 + x^2 - 14x + 6$ with no remainder? Justify your answer.

9. [6] (Story Problem Worksheet) Choose *ONE* of the following. Clearly identify which of the two you are answering and what work you want to be considered for credit.
- (a) (Word Problems Worksheet) An airplane flew with the wind for 2.5 hours and returned on the same route against the wind in 3.5 hours. If the cruising speed of the plane was a constant 360 mph in air, how fast was the wind blowing?
 - (b) (Word Problems Worksheet) A radiator contains 8 quarts of fluid, 40% of which is antifreeze. How much fluid should be drained and replaced with pure antifreeze so that the new mixture is 60% antifreeze?