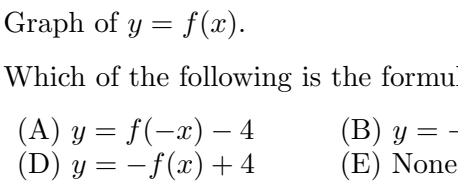
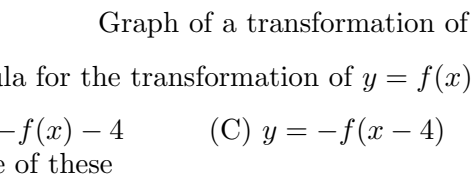
Exam #2 · Tuesday Oct. 11, 2005

MATH 110 · Section 10 · Fall 2005 Name _____

1. (**5 points**) The graph of $y = f(x)$ is shown below, followed by a transformation of $y = f(x)$.



Graph of $y = f(x)$.



Graph of a transformation of $y = f(x)$.

Which of the following is the formula for the transformation of $y = f(x)$ shown above?

(A) $y = f(-x) - 4$ (B) $y = -f(x) - 4$ (C) $y = -f(x - 4)$
(D) $y = -f(x) + 4$ (E) None of these

2. (**5 points**) You can get the graph of $y = f(-2x)$ by transforming the graph of $y = f(x)$ in the following way:

(A) Shrink horizontally and reflect across the x-axis
(B) Shrink horizontally and reflect across the y-axis
(C) Stretch vertically and reflect across the x-axis
(D) Stretch vertically and reflect across the y-axis
(E) None of these

3. (**5 points**) The relation that vertically shrinks the graph of $y = |x|$ and shifts the graph down ten units is:

   (A) $y = \frac{5}{4}|x| - 10$ (B) $y = |\frac{7}{3}x - 10|$ (C) $y = \frac{3}{8}|x| - 10$
   (D) $y = 7|x - 10|$ (E) None of these

4. Let $r(t) = |t - 1|$ and $s(t) = \sqrt{t - 5}$.

   (a) (**5 points**)Find the composition $r(s(t))$.

   (b) (**5 points**)Find the domain of the composition $r(s(t))$.

5. (**5 points**) Given the function $h(x) = \sqrt{x^2 + 1}$, find two functions $f(x)$ and $g(x)$ such that $h(x) = f(g(x))$. (Do not use $f(x) = x$ or $g(x) = x$.)

6. (**10 points**) The following table lists (x, y) coordinates of four points, all of which lie on the same line. Fill in the blanks.

x	y
2	5.0
3	
	9.5
8	14.0

7. (**5 points**) Given the following graph of a line, write an equation for the line in standard form (i.e. $Ax + By + C$ for some A, B, and C which you are to determine).

8. (**5 points**) A *cliché* is a worn-out saying. (For example, math problems of the form "One train travels south from Chicago at 50 miles per hour ...." are clichés.) During an all-day algebra review session, instructor Kerl utters 5 mathematical clichés per hour, starting at 8 a.m. In another room, instructor Gorlina utters 7 mathematical clichés per hour, starting at 10 a.m. At what time of day will instructor Kerl's students have heard the same number of clichés as instructor Gorlina's students?

9. Let $f(x) = \frac{x^2}{8} + x - 1$.

   (a) (**6 points**) Use algebraic methods to find the x-intercept(s), y-intercept(s), and vertex. (If there are no x-intercept(s), please say so, along with a reason why. Likewise for y-intercept(s) and vertex.)

   (b) (**4 points**) Using the space provided, sketch the parabola defined by $y = f(x)$.

10. (**5 points**) Given the following graph of a parabola, find an equation for the graph in general form (i.e. $y = ax^2 + bx + c$ for some a, b, and c which you are to determine).

11. Your granddaughter picks up a rock from the surface of the moon and throws it upward from an initial height of 1 meter with an initial velocity of 7.2 meters per second. The height of the rock above the lunar surface from that time until the rock lands is described by the equation $h(t) = -0.8t^2 + 7.2t + 1.0$. The rock does not bounce.

    (a) (**5 points**)After how many seconds does the rock reach its maximum height?

    (b) (**5 points**)What is the maximum height the rock reaches?

    (c) (**5 points**)Using everything you know: What is the height of the rock after 12 seconds?

12. (**5 points**) Which of the following can be complete graphs of a polynomial?

    (A) 1 and 2 only (B) 1 and 3 only (D) 2 only
    (C) 2 and 3 only (E) All of them

13. (**5 points**) Which of the following can be complete graphs of a fourth-degree polynomial?

(B) 1 only (C) 1 and 2 only (A) 1 and 3 only
(E) All of them (E) None of them

14. (**5 points**) Let $P(x) = 3x^3 - 21x^2 + 108$. Given that 6 is a root of $P(x)$, find the other two roots, if they exist. If there are no real roots, please say so, along with a reason why it is so.

15. (**5 points**) Determine an equation for a polynomial $P(x)$ with the following properties:
    - The degree of $P(x)$ is 4.
    - $P(x)$ has a single root at -2, a double root at 1, and a single root at 4.
    - The point $(-1, -4)$ lies on the graph of the polynomial.