Your Name (print clearly)

Monday, November 2

Page	Total Points	Score
1	15	
2	20	
3	18	
4	15	
5	20	
6	12	
extra credit	5	
Total	100	

Instructions and information:

- Please turn off cell phones or any other thing that will go BEEP.

- Calculators are **not** allowed on this test.

- Read the directions for each problem. You must always show your work to receive partial credit.

- Be wary of doing computations in your head. Instead, write out your computations on the exam paper.

- If you need more room, use the backs of the pages and indicate to the grader where to look.

- Raise your hand (or come up to the front) if you have a question.

Formulas

$n(t) = n_0 2^{t/a}$ $n(t) = n_0 e^{rt}$

$m(t) = m_0 2^{-t/h}$ $m(t) = m_0 e^{rt}$ where $r = (\ln 2)/h$,

$A(t) = P(1 + \frac{r}{n})^{nt}$ $A(t) = P e^{rt}$

$\log_b x = (\log_a x)/(\log_a b)$

1. The owner of a toy factory estimates that it costs \$1300 to produce 100 toys in one day and \$2100 to produce 300 toys in one day.

   (a) (3 points) Assuming that the relationship between cost and the number of toys produced is linear, find a linear function C that models the cost of producing x toys in one day.

   (b) (2 points) At what rate does the factory's cost increase for every additional toy produced?

2. (5 points each) Let $f(x) = \sqrt{9 - x^2}$ and $g(x) = \sqrt{x + 2}$.

   (a) Find f/g and state its domain.

   (b) Find $f \circ g$ and state its domain.

3. (5 points) Find the inverse of $h(x) = \frac{(2-x^3)^5}{7}$.
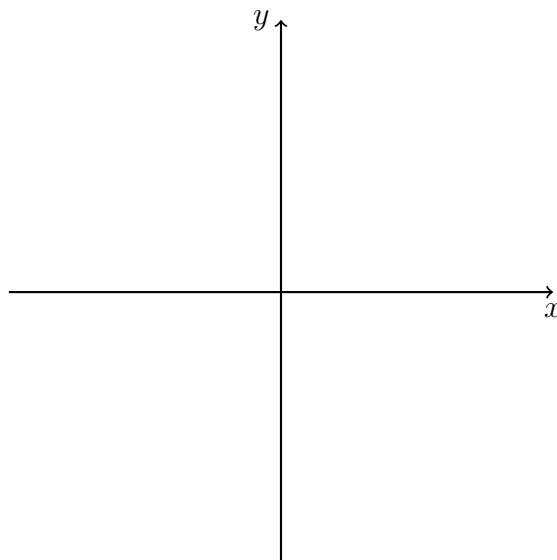
4. Let $g(x) = 5x^2 - 15x + 2$.

   (a) (6 points) Express g in standard form.

   (b) (2 points) Find the vertex of the graph of g.

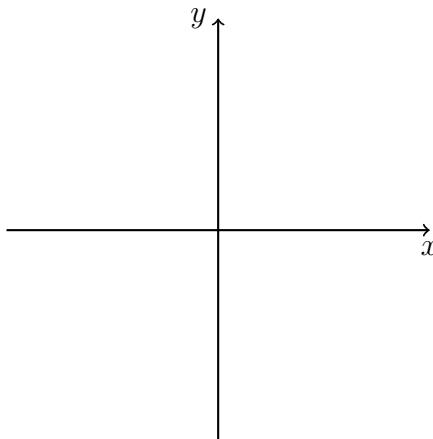   (c) (2 points) Determine the range of g.

5. (5 points)
   Sketch the graph of $P(x) = -(x+1)^3(x-3)^2$
   on the axes. Make sure you label all inter-
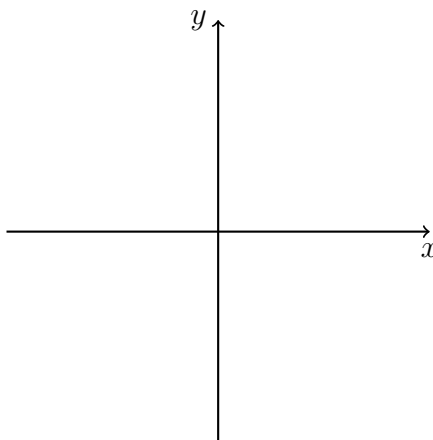   cepts and exhibits proper end behavior.

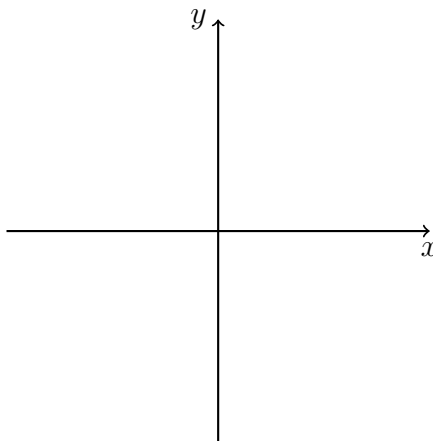6. (6 points each) Sketch the graphs below. Label any asymptotes and intercepts.

(a) $f(x) = 2 - \sqrt{x}$

(b) $f(x) = \dfrac{-3}{(x+4)^2}$

(c) $f(x) = |x^2 - 1|$

7. (5 points) Let $r(x) = \dfrac{x^2 - 25}{3x^2 + 17x + 10} = \dfrac{(x-5)(x+5)}{(3x+2)(x+5)}$

   (a) Find any horizontal asymptotes or state that none exist.

   (b) Find any vertical asymptotes or state that none exist.

8. (5 points) Solve the rational inequality $\dfrac{6x-7}{5x-2} \geq 1$. Give your answer in interval notation.

9. (5 points) Find the quotient, $Q(x)$, and remainder $R(x)$, of $\dfrac{6x^2 - 17x + 7}{2x - 3}$.

10. (5 points) Expand $\boxed{\log_2 x\sqrt{\dfrac{y}{z}}}$ using the Laws of Logarithms.
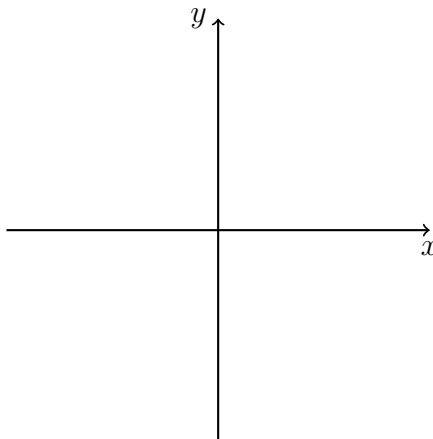
11. (5 points each) Solve.
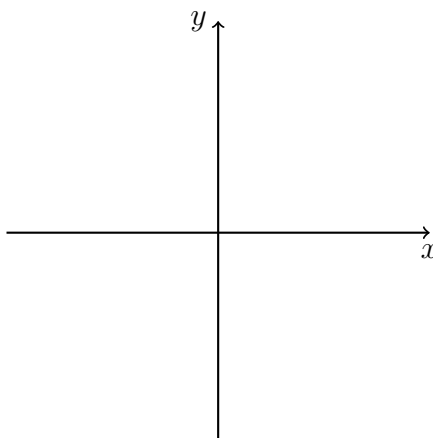
(a) $10^{1-x} = 7$

(b) $e^{2x} + e^x - 20 = 0$

(c) $\log_6 x + \log_6(x+1) = 1$

12. (5 points each) Sketch the graphs below. Label any asymptotes and intercepts.

(a) $h(x) = 4 - 2^{x-1}$

(b) $f(x) = 1 + \ln(-x)$

EXTRA CREDIT (5 points) A certain population of fish has a relative growth rate of 2.5% per year. How long will it take for the population to double? (Yes. You do have enough information to complete t his problem.)