

HOMEWORK 6 - MATH 140

DUE DATE: Wednesday, October 13

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Solve the following inequalities

(a) $x^3 + 2x^2 - 3x > 0$

(b) $\frac{x+2}{x-4} \geq 1$

(c) $\frac{2x+5}{x+1} > \frac{x+1}{x-1}$

(d) $\frac{x^2(3+x)(x+4)}{(x+5)(1-x)} > 0$

2. Use the Factor Theorem to determine whether $x - 3$ is a factor of $f(x) = 4x^3 - 3x^2 - 8x + 4$. If it is, write f in factored form $f(x) = (x - 3)(\text{quotient})$.

3. Find the real zeros of $f(x) = x^3 + 2x^2 - 5x - 6$. Use the real zeros to factor f .

4. Find the domain and the formula of the function $f \circ g$ if

(a) $f(x) = \frac{1}{x+3}$ and $g(x) = \frac{-2}{x}$

(b) $f(x) = x - 2$ and $g(x) = \sqrt{1 - x}$

5. Find the inverse function of f , its domain and its range and check your answer.

(a) $f(x) = \frac{4}{2-x}$

(b) $f(x) = \frac{-3x-4}{x-2}$

(c) $f(x) = 4\sqrt{x-3}, x \geq 3$.

6. (a) Graph the function $f(x) = 3^x$ by using a small table of values.

- (b) Graph the function $f(x) = (\frac{1}{5})^x$ and then use transformations to obtain from it the graph of $g(x) = 5^{2-x} - 3$.

7. Solve the exponential equations (a) $4^{x^2} = 2^x$ and (b) $(\frac{1}{5})^{2-x} = 25$.

8. Translate from the exponential to the logarithmic or from the logarithmic to the exponential domain as appropriate.

$$2^x = 7.2, \quad x^{\sqrt{2}} = \pi, \quad \log_2 6 = x, \quad \log_{\pi} x = \frac{1}{2}$$