

MATH 125
SPRING 2020
EXAM 2

NAME:

1. 10 pts. Use the Binomial Theorem to find the coefficient of x^3 in the expansion of $(2x + 1)^{12}$.
2. 10 pts. Construct a polynomial function of degree 6 having zeros -1 (with multiplicity 2), 5 (with multiplicity 1), and 0 (with multiplicity 3). Don't bother to expand the product.
3. 10 pts. Construct a polynomial function of degree 3 having zeros -4 , -1 , and 2 , and also having y -intercept 16 .
4. 15 pts. Let $f(x) = 3x^4 + 4x^3 + 7x^2 + 8x + 2$. Use the Rational Zeros Theorem to find all the real zeros of f , then use the zeros to factor f over the real numbers.
5. 15 pts. Solve the equation in the real number system:

$$2x^4 + 7x^3 + x^2 - 7x - 3 = 0.$$

6. 10 pts. Given that $3i$ is a zero of

$$H(x) = 3x^4 + 5x^3 + 25x^2 + 45x - 18,$$

find the remaining zeros of H .

7. 5 pts. each Let

$$U(x) = \frac{8x^2 + 26x - 7}{4x - 1}.$$

- (a) Find the domain of U .
 - (b) Find the intercepts of U .
 - (c) Find all vertical asymptotes of U , if any.
 - (d) Find the horizontal or oblique asymptote of U , if any.
8. 10 pts. each Solve each inequality algebraically.
 - (a) $x^2 + 6x < 16$.
 - (b) $\frac{5}{x-1} \geq \frac{3}{x+2}$
 9. 10 pts. For $f(x) = x^2 - 6$ and $g(x) = 4/x$ find $(f \circ g)(4)$, $(g \circ f)(2)$, $(f \circ f)(1)$, and $(g \circ g)(-2)$.

10. 10 pts. each Let

$$f(x) = \sqrt{2x - 12} \quad \text{and} \quad g(x) = \frac{3}{x}.$$

- (a) Find $f \circ g$, and state its domain.
- (b) Find $g \circ f$, and state its domain.
- (c) Find $g \circ g$, and state its domain.

11. 10 pts. each Find the inverse of each function.

(a) $f(x) = 9 - 3x$

(b) $g(x) = 2 + \frac{3}{x^2}, \quad x < 0$