

MSLC – Math 1148  
Exam 2 Review

*Disclaimer: This should NOT be used as your only guide for what to study.*

1. Find all real zeros and the multiplicity of those zeros for the given polynomials, then find their y-intercepts and sketch the graph.

a.  $p(x) = (2x-1)(x+1)(x+3)$

b.  $p(x) = \frac{1}{4}(x+1)^3(x-3)$

c.  $p(x) = (x+1)^2(x-3)^2$

2. Factor each polynomial, then use the factored form to find the zeros and the multiplicity of each zero.

a.  $P(x) = x^3 + 2x^2 - 8x$

b.  $P(x) = x^5 - 9x^3$

c.  $P(x) = x^3 + 3x^2 - 4x - 12$

3. Find the quotient and remainder of the following:

a.  $\frac{x^2 + 4x - 9}{x + 3}$

b.  $\frac{x^3 + 6x + 5}{x^2 - 2x + 2}$

c.  $\frac{2x^3 + 7x^2 + 6x - 5}{2x - 1}$

4. If  $f(x) = 5 - x$  and  $g(x) = 2x^2 - 3x + 4$  find:

a.  $(f + g)(x)$

b.  $(f - g)(x)$

c.  $(f - g)(2)$

d.  $(f \cdot g)(x)$

e.  $(f \cdot g)(0)$

f.  $\left(\frac{f}{g}\right)(x)$

g.  $f(g(x))$

h.  $g(f(x))$

i.  $g(f(1))$

5. A company that makes widgets has determined that its monthly profit can be approximately by the function  $f(p) = -80p^2 + 3440p - 36,000$  where  $p$  is the price per widget and  $f(p)$  is the monthly profit based on that price.

- What price(s) allows the company to break even?
- Find the price that generates the maximum profit.
- Find the maximum profit.

6. Given  $f(x) = \sqrt{x+1}$  and  $g(x) = \frac{1}{2x+1}$  find:

- $f \circ g$
- $g \circ f$
- $f \circ f$
- $g \circ g$

7. Find the domain of the following rational functions:

a.  $r(x) = \frac{2}{x^2 + 3x - 4}$

b.  $r(x) = \frac{2}{x^2 + 4}$

8. Solve the following inequalities. Write your answer using interval notation.

a.  $5(1-2x) \leq 9(x-3)$

b.  $\frac{2}{3} - \frac{1}{2}x \geq \frac{1}{6} + x$

c.  $(x+3)^2(x+1) < 0$

d.  $\frac{x}{x+1} > 3x$

9. Find all intercepts and asymptotes, then sketch the graph of each rational function.

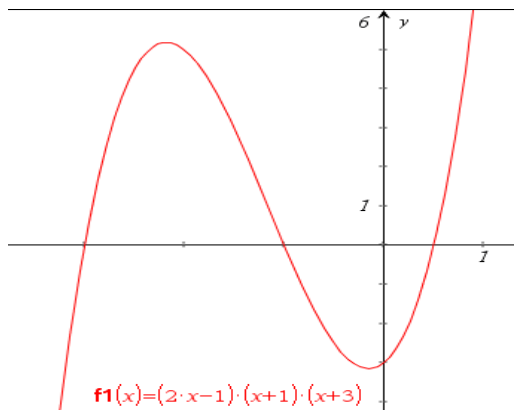
a.  $R(x) = \frac{x-2}{x^2-4x}$

b.  $R(x) = \frac{x^2+3x}{x^2-x-6}$

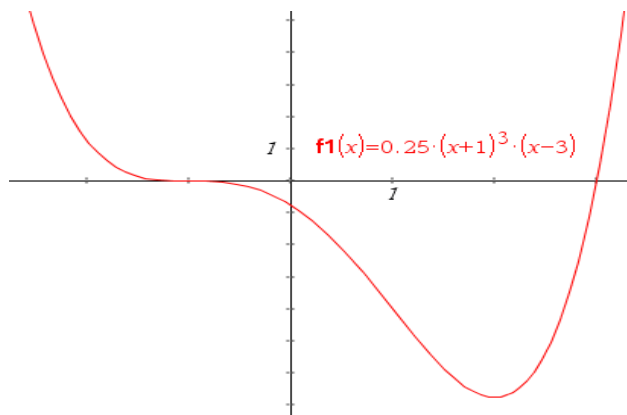
c.  $R(x) = \frac{x^3+4}{2x^2+x-1}$

## ANSWERS

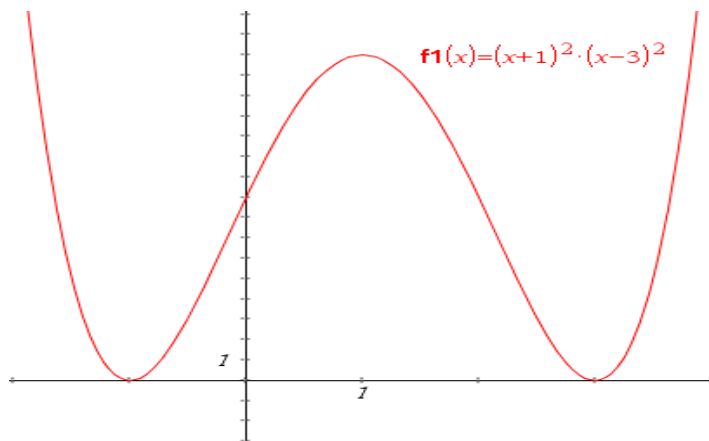
1. a) Zeros:  $\frac{1}{2}$  (multiplicity:1);  $-1$  (multiplicity:1);  $-3$  (multiplicity:1); y-int:  $(0, -3)$



1. b) Zeros:  $-1$  (multiplicity:3);  $3$  (multiplicity:1); y-int:  $(0, -\frac{3}{4})$



1. c) Zeros:  $-1$  (multiplicity:2);  $3$  (multiplicity:2); y-int:  $(0, 9)$



2. a)  $P(x) = x(x+4)(x-2)$ ;

Zeros: 0 (multiplicity:1); -4 (multiplicity:1); 2 (multiplicity:1)

b)  $P(x) = x^3(x+3)(x-3)$ ;

Zeros: 0 (multiplicity:3); -3 (multiplicity:1); 3 (multiplicity:1)

c)  $P(x) = (x+3)(x-2)(x+2)$ ;

Zeros: 2 (multiplicity:1); -2 (multiplicity:1); -3 (multiplicity:1)

3. a)  $x+1-\frac{12}{x+3}$ ;    b)  $x+2+\frac{8x+1}{x^2-2x+2}$ ;    c)  $x^2+4x+5$

4. a)  $2x^2-4x+9$     b)  $-2x^2+2x+1$     c)  $-3$     d)  $-2x^3+13x^2-19x+20$   
e)  $20$     f)  $\frac{5-x}{2x^2-3x+4}$     g)  $-2x^2+3x+1$     h)  $2x^2-17x+39$     i)  $24$

5. a) prices: \$18 and \$25

b) price: \$21.50

c) Max. profit: \$980

6. a)  $(f \circ g)(x) = \sqrt{\frac{2x+2}{2x+1}}$     b)  $(g \circ f)(x) = \frac{1}{2\sqrt{x+1}+1}$

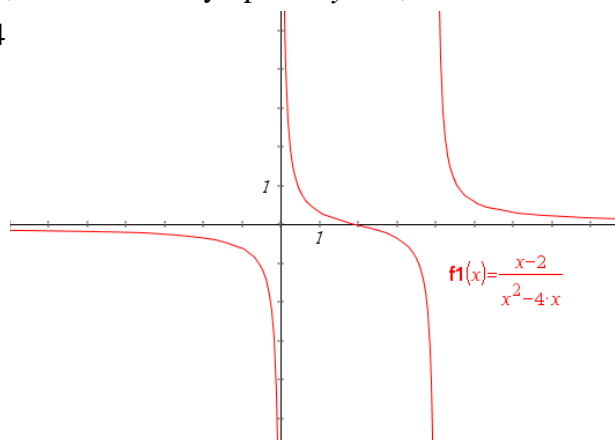
c)  $(f \circ f)(x) = \sqrt{\sqrt{x+1}+1}$     d)  $(g \circ g)(x) = \frac{2x+1}{2x+3}$

7. a) Domain:  $(-\infty, -4) \cup (-4, 1) \cup (1, \infty)$     b)  $(-\infty, \infty)$

8. a)  $\left[\frac{32}{19}, \infty\right)$     b)  $\left(-\infty, \frac{1}{3}\right]$     c)  $(-\infty, -3) \cup (-3, -1)$     d)  $(-\infty, -1) \cup \left(-\frac{2}{3}, 0\right)$

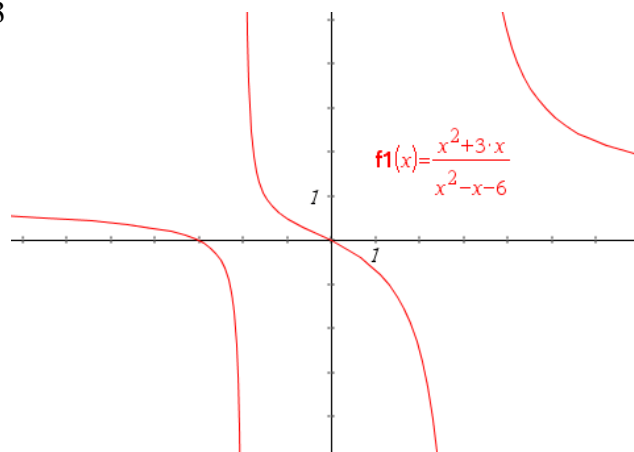
9. a) no y-intercept, x-intercept:  $(2,0)$ ; Horizontal Asymptote:  $y = 0$ ;

Vertical Asymptotes:  $x = 0$ ;  $x = 4$



9. b) y-intercept:  $(0,0)$ , x-intercepts:  $(0,0)$  &  $(-3,0)$ ; Horizontal Asymptote:  $y = 1$ ;

Vertical Asymptotes:  $x = -2$ ;  $x = 3$



9. c) y-intercept:  $(0,-4)$ , x-intercepts:  $(\sqrt[3]{-4}, 0)$ ; Slant Asymptote:  $y = \frac{1}{2}x - \frac{1}{4}$ ;

Vertical Asymptotes:  $x = -1$ ;  $x = \frac{1}{2}$

