You may earn back up to half the points that you lost in the original test by redoing problems and doing additional problems. For each problem that you wish to attempt you must provide the following:

1. A neat, concise, accurate, and correct answer to the problem that you missed
2. An explanation for why you missed the problem
3. Neat, concise, accurate, and correct answers to the supplementary problems associated with that problem

If you do not provide the first two items correctly, then you will not earn back any points and your other work will remain ungraded. If you do provide the first two items correctly, then the number of points you earn back will be determined by how well you do the supplementary problems— a perfect score will earn back half the points you lost. A score of zero will earn back no points. Partial credit may land you anywhere in between. Since you will have a lot of time to work on this, expect me to be very particular in my grading. Ask me if you have any questions about what I am (or am not) looking for.

1. Convert between interval notation and inequalities:

   (a) \((-2, 3]\)
      i. \([-2, 3)
      ii. \([-2, 3]
      iii. \((-2, 3)
      iv. \((-1, 10)

   (b) \([4, \infty)
      i. \((4, \infty)
      ii. \((-\infty, 4)
      iii. \((\infty, 4]

   (c) \(-2 < x \leq 2
      i. \(-2 \leq x \leq 2
      ii. \(-2 < x < 2
      iii. \(-2 \leq x < 2

   (d) \(x < -5
      i. x \leq -5
      ii. x > -5
      iii. x \geq -5
      iv. x = -5

2. Factor the following expressions. If it can not factor say so (and why)
(a) $32x^3 - 27$
   i. $32x^3 + 27$
   ii. $16x^3 - 16$
   iii. $16x^3 - 27y^3$

(b) $x^2 + x + 4$
   i. Produce a quadratic whose discriminant is less than 0
   ii. Produce a quadratic whose discriminant is 0
   iii. produce a quadratic whose discriminant is greater than 0
   iv. $x^2 - 4x + 4$

(c) $10bc - 2c + 15bd - 3d$
   i. $10cd - 2d + 15ce - 3e$
   ii. $24x - 4bx + 36y - 6by$
   iii. $-((5a)/3) + 20b + (2ac)/3 - 8bc$

(d) $2x^2 - x - 15$
   i. $2x^2 + 15$
   ii. $2x^3 - 56$
   iii. $3x^2 - x - 14$
   iv. $2x^4 - x^2 - 15$

3. Let $A$ represent the point $(-1,2)$ and $B$ the point $(2,-5)$.

   (a) What is the distance between the points $A$ and $B$ (exact answer)?
   (b) What is the equation of the line joining $A$ and $B$?
   (c) What is the value of the slope of any line perpendicular to your answer to the previous question?
   (d) What is the equation of the line passing through the midpoint of $A$ and $B$ and parallel to the line containing $A$ and $B$?
   (e) What is the equation of the circle with center $B$ and radius 7?

For any of the above repeat with the following changes:

(a) $B = (1,-3)$
(b) $B = (-5,2)$
(c) $B = (1,1)$
(d) $B = (-1,-1)$

4. Solve the inequality $-x^2 + x + 2 \leq 0$
   (a) Solve the inequality $-x^2 + x + 2 \geq 0$
(b) Solve the inequality $(x - 3)(x - 2)(x + 1) \leq 0$

(c) Solve the inequality $-x^2 - 2x + 3 > 0$

5. Solve the following equations and inequalities (use back of sheet for scratch paper.) Put your answer in interval notation (when appropriate). Answers must be in simplest form, and not decimal approximations for full credit:

(a) $2 \leq 3x - 5 < 9$
   i. $2 \leq 7x + 3 < 9$
   ii. $2 \leq |2x + 1| < 9$
   iii. $2 \leq (x - 1)(x + 2) < 9$ (this one is a bit tricky)

(b) $|2x - 1| > 3$
   i. $|2x - 1| > 3$
   ii. $|1 - 2x| > 3$
   iii. $|1 + 2x| < 3$
   iv. $|1 + 2x| > 3$

(c) $2x^2 - 7x + 9 = (x - 3)(x + 1) + 4x$
   i. $2x^2 - 3x + 4 = (x - 2)(x + 2) + 4x + 4$
   ii. $x^2 - 4 = (x - 4)(x) - 4x - -10$
   iii. $2x^2 = (x - 4)(x + 1) - 3x + 10$
   iv. $2x^2 - 3x + 4 == (x - 2) + 4x + 4$

6. Let $f(x) = \frac{2x-2+\frac{13x-16}{x-7}}{2x-2+\frac{5x+4}{x-7}}$

   (a) Simplify $f(x)$
   (b) What is the domain of $f(x)$?

For any of the above answer with the following changes

(a) $f(x) = \frac{2x+\frac{13x-3}{x+4}}{2x+\frac{5x+4}{x+4}}$
(b) $f(x) = \frac{2x+\frac{13x-3}{x+4}}{2x+\frac{5x+4}{x+4}}$
(c) $f(x) = \frac{2x-8+\frac{13x-55}{x+2}}{2x-8+\frac{5x+4}{x+2}}$
(d) $\frac{2x+1+\frac{x+5}{x}}{2x-1+\frac{x+4}{x-2}}$

7. Simplify the expressions:

(a) $\frac{(a^9b^6)^{1/3}}{(a^6b^2)^{-1/2}}$
\[
\begin{align*}
i. & \quad \frac{(x^a y^b)^{-1/2}}{(x^c y^d)^{-1/2}} \\
ii. & \quad \frac{(x^a y^b)^{-1/3}}{(x^c y^d)^{-1/2}} \\
iii. & \quad \frac{(x^a y^b)^{1/3}}{(x^c y^d)^{1/2}}
\end{align*}
\]

(b) \[3 \sqrt{\frac{9x^2}{y^2}} \cdot 3 \sqrt{\frac{3x^2}{y^2}} \]

\[
\begin{align*}
i. & \quad 3 \sqrt{\frac{8x^2}{y^2}} \cdot 3 \sqrt{\frac{8x}{y}} \\
ii. & \quad 3 \sqrt{\frac{4x^2}{y^2}} \cdot 3 \sqrt{\frac{2x}{y}} \\
iii. & \quad 3 \sqrt{\frac{4x^2}{y}} \cdot 3 \sqrt{\frac{3x}{y}}
\end{align*}
\]

(c) Complete the square to solve \(3x^2 - 4x - 1 = 3\)

i. As above, but replace 3 with 10
ii. As above, but replace \(3x^2\) with \(5x^2\)
iii. As above, but replace \(-4x\) with \(7x\)
iv. Complete the square to solve (symbolically) \(x^2 + bx = 10\)

(d) What is the domain of \(f(x) = \sqrt{(4 - x)(x - 2)}\)

i. What is the domain of \(f(x) = \sqrt{(5 - x)(x - 3)}\)
ii. What is the domain of \(f(x) = \sqrt{(x - 4)(x - 2)}\)
iii. What is the domain of \(f(x) = \sqrt{(4 - x)(x + 2)}\)