

1. [12 pts] In your bluebook, write **T** if the statement is true and write **F** if the statement is false. No justification required and no partial credit given.
- If  $x$  is any real number whose square equals  $c$ , then  $x$  always equals the square root of  $c$ .
  - $\frac{\sec \theta}{\csc \theta} = \tan \theta$
  - $\cos^4 4x - \sin^4 4x = \cos 8x$
  - Let  $w, x, y, z$  represent positive quantities. Then  $\sqrt{(xy)^2 + (w+z)^2} = xy + (w+z)$
  - $|x - 4| \geq 4$  is equivalent to saying that  $x$  is in the set  $(-\infty, 0] \cup [8, \infty)$
  - The lines  $3x + 5y - 7 = 0$  and  $6x + 10y + 4 = 0$  do not intersect.
2. [10 pts] Find the  $x$ - and  $y$ -intercepts of the line that passes through the point  $(6, 5)$  and is perpendicular to the line that passes through the points  $(-5, 2)$  and  $(10, -7)$ .
3. [25 pts] Simplify the following expressions and eliminate any negative exponents. Assume that all letters denote positive numbers.
- $\left(\frac{2a^{-1}b}{a^2b^{-3}}\right)^{-3}$
  - $\frac{\sqrt[3]{8x^2}}{\sqrt{x}}$
  - $(2x^3y^{-1/4})^2 (8y^{-3/2})^{-1/3}$
  - $\frac{2}{x} + \frac{3}{x-1} - \frac{4}{x^2-x}$
  - $\frac{1 + \csc y}{\cos y + \cot y}$
4. The following problems are not related.
- [4 pts] Rationalize the numerator of  $\sqrt{x+1} - \sqrt{x}$ .
  - [5 pts] Factor  $3x^{-1/2} + 4x^{1/2} + x^{3/2}$  completely, writing your final answer without any fractional exponents.
  - [5 pts] Solve the equation  $3x^2 - 6x - 1 = 0$  by completing the square.
  - [5 pts] Evaluate  $\sin(\theta - \phi)$  under the following conditions:  $\tan \theta = \frac{4}{3}$ ,  $\theta$  in Quadrant III,  $\sin \phi = -\frac{\sqrt{10}}{10}$ ,  $\phi$  in Quadrant IV. Recall that  $\sin(u - v) = \sin u \cos v - \cos u \sin v$ .
  - [10 pts] Consider the function  $f(x) = (x^4 - 10x^2 + 9)^{-1/2}$ .
    - Find the domain of  $f(x)$ , writing your answer in interval notation.
    - Is  $f(x)$  even, odd or neither? Justify your answer.
    - What symmetry, if any, does the graph of  $f(x)$  possess?
5. [24 pts] Solve the following equations.
- $\sqrt{5-x} - x = -3$
  - $\frac{x}{2x+7} - \frac{x+1}{x+3} = 1$
  - $3 \tan^2 \theta - 1 = 0$ , finding all solutions in the interval  $[0, 2\pi)$ .
  - $\cos 2\theta = -\sin \theta$ , finding all solutions in the interval  $[0, 2\pi)$ .