

## Rose-Hulman Mathematics Precalculus Gateway Exam

Rose-Hulman expects that its students will be proficient in pre-calculus topics upon entering Rose-Hulman. Therefore, students who have not demonstrated college level mastery of calculus courses (through an AP exam or transfer credit) will be required to demonstrate that mastery through a precalculus gateway exam. Students will be allowed to take the exam several times but a high level of mastery will be required. Your instructor will give all the details for taking (and retaking if needed) of the exam and review of the exam results. The topics will be the same for every exam but the questions will vary. The list of topics is given below and a sample practice exam is attached.

Topic for each problem:

1. Find the equation of a line given two points (no y-intercept given).
2. Use the quadratic formula to solve a quadratic equation in standard form (must have non-integer roots).
3. Solve a formula for one unknown.
4. Add rational expressions.
5. Use laws of exponents.
6. Rationalize a denominator and simplify.
7. Write an expression as a single logarithm.
8. Give exact values of trigonometric functions.
9. Sketch the graph of an exponential, logarithmic, sine, or cosine function.
10. Solve an equation involving logarithms (no extraneous solutions).



5. Which of the following are equivalent to  $(u^{-6})^8$ ? (Circle all the correct answers, there may be more than one.)

(a)  $\left(\frac{1}{u^{14}}\right)^8$  (b)  $u^2$  (c)  $u^{-6}u^8$  (d)  $u^{-3/4}u^8$  (e)  $u^{-48}$

6. Rationalize the denominator and simplify:  $\frac{4}{1 + \sqrt{3}}$

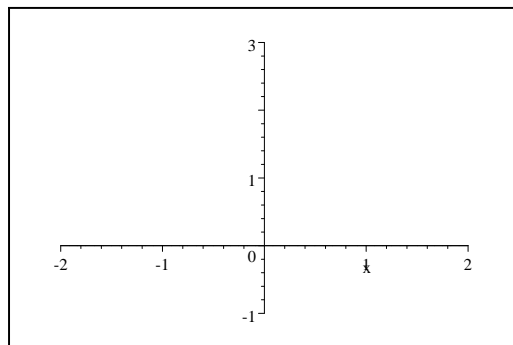
7. Rewrite the expression as a single logarithm:  $4 \log_2(x) - \left(\frac{1}{3} \log_2(y) - 5 \log_2(z)\right)$

8. Evaluate.

$$\sin\left(\frac{5\pi}{6}\right) =$$

$$\cos\left(\frac{5\pi}{6}\right) =$$

9. Sketch the graph of  $e^{-x}$ . Label one point on the graph and identify any asymptotes.



10. Solve  $\log_{10}(5x - 3) = 1$  for  $x$ .