MAC 2311 Jan 9, 2014
PreReq Quiz and Key Prof. S. Hudson

1) [20 pts for a)] Solve each of these. Answer with a number, a list of numbers, or with interval notation.

a) $\frac{x-4}{x+2} < 0$

b) [Bonus / Corrected version] $\frac{(e^{2y}-1)(1-\ln y)}{y-2} = 0$

2) [20 pts each] Simplify each of these.

a) $\sin(7\pi/6)$

b) $\sec(\sin^{-1}(x))$

3) [20 pts] Find the surface area of a 3-dimensional cube with side length 2 feet. Explain your reasoning clearly in a few sentences.

4) [20 pts] The graph of $y = f(x) = x^2 - 2x$ intersects the line $y = 3$ at two points P and Q in the plane. Find the distance between P and Q.

Remarks: The scores ranged from 0 to 107 (approx 10 bonus points were possible). The average was approx 65, not including scores below 30. The scores were fairly high on page 2 and rather low on problems 1a and the bonus 1b. Rough scale:

A's 81-100
B's 71- 80
C's 61-70
D's 51-60

If you scored from 50 to 60, past experience suggests that you probably will not pass this course. I would not recommend continuing without some specific plan to strengthen your PreCalc skills. I will leave this to you, but for advice see me or Justin or the bottom of my HW page.

If you scored below 50, or didn't take the quiz, and you want to stay in the class, you *must* see me during office hours, or email me for an appt. I will probably require approx 100 PreCalc exercises and/or some sessions with Justin before allowing you to take Exam I. This still does not mean your odds are good, but I hope you will at least have a fighting chance to pass.

Regardless of your score, you may learn something about yourself by comparing your answers and methods with the ones below. I'd strongly suggest drawing pictures for problems 2a, 2b, 3 and 4 (though I did not require pictures when grading these). Problems 2a and 2b are obviously about trig. They are fairly straightforward, with standard solution methods you may have memorized. Problems 1a and 1b are about algebra, a bit less standard, perhaps requiring some thought about how to proceed. Problems 3 and 4 are more geometric, and maybe a bit non-standard. They were meant to test your thinking skills, though in hindsight, they were probably a bit too easy for that.

Answers:

1a) Since $x + 2 > x - 4$ the only way to get a negative fraction is $x + 2 > 0 > x - 4$ (negative over positive). Solving these 2 inequalities separately, we get $x > -2$ and $x < 4$. According to the instructions, we should rephrase this as $x \in (-2, 4)$.

A number line is another good tool for problems like this (see me if you want help with this method).

If you wrote $(-2, 4)$ *and nothing else*, you probably got about 17 out of 20 points. Show all your work and reasoning !

1b) [Bonus] This problem had a typo, so I decided to count it as a bonus question, for 10 points (actually, I gave 12 for a few very good answers). I adjusted the other questions on page 1, from 15 points each to 20 points each.

The problem was $\frac{(e^{2t}-1)(1-\ln y)}{y-2} = 0$, which accidentally included two variables t and y. But it is not totally crazy (and the typo did not seem affect many people very much). Set $e^{2t} - 1 = 0$ and get $t = 0$. Set $1 - \ln y = 0$ and get $y = e$. So the answer is 'Either $t = 0$ or $y = e$.'

For the corrected version above, the method is the same, just replace every t by y.

2a) $-1/2$. There are many methods, such as using $\sin(\pi/6) = 1/2$. I gave full credit for $-1/2$ even with no work because it is plausible that you had this memorized. But I'd suggest leaving a note. Please check that your grade on 2a and on 2b is out of 20 points, not out of 15, as originally planned.

2b) sec = hyp / adj = $\frac{1}{\sqrt{1-x^2}}$. You get the sides from a picture as shown in class with a similar example.

3) 6 sides, each with area 2×2 makes 24 ft^2. Most people did pretty well on this one, including a clear explanation. This shows some ability to think for yourself on a new problem. Some people computed volume = 8 instead.

4) Dist = 4. Set $x^2 - 2x = 3$ and solve (by factoring). Get $x = -1$ or $x = 3$. The points are $(-1, 3)$ and $(3, 3)$ and the distance is $3 - (-1) = 4$. You don't need the distance formula since they are at the same height.

Some people apparently found the points P and Q by guesswork (or using an xy table, which is roughly the same). I gave full credit for that, if enough work was shown, but I do sometimes deduct points for unreliable methods, and for unclear ones.