MAC 2313 Jan 13, 2021
Quiz 0 Key Prof. S. Hudson

1) Evaluate $\int_0^{2\pi} \cos^2 x \, dx$.

2) Answer True or False for each part. You do not have to explain.

If $F'(x) = x^2$ on $[0, 5]$, then $F(x) = x^3/3$ on $[0, 5]$.

If f is continuous on $[0, \pi]$, then f has an antiderivative there.

If velocity is positive for $0 \leq t \leq 5$ seconds, then the distance traveled is the displacement.

The domain of f' is the same as the domain of f.

The function $f(x) = \tan(x)$ is integrable on $[0, \pi]$.

3a) Let $f(x) = x^2 - 4x$ on the interval $[0, 3]$. Find the extreme values of f.

3b) Describe your plan on 3a), using vocabulary such as *stationary points*.

3c) What is the range of the function f in 3a) ?

4) Find the equation of the tangent line to the graph of $y = x^2$ at the point (1,1).

Remarks, Scale and Answers: The average of all the scores, including some students who are not yet on my class roster, was 56. Among scores over 40, the average was 62. The averages for problems 1 through 4 separately were 75, 56, 40 and 62. The top two scores were 89 and 74. Overall the results are OK for a diagnostic quiz. Review any topics (such as extreme values) that you were not very successful on.

Here is an advisory scale for the quiz, not as official, but probably more accurate than the one on the syllabus. If your score was 62, for example, that is a B-. If you scored low and want to replace your quiz grade with your final exam grade, then study the problems you missed and see me or Melissa about them (within about a week).

A's 70 to 100
B's 60 to 69
C's 50 to 59
D's 40 to 49

1) [20 points] π. We did this in class Monday using $\cos^2 x = \frac{1+\cos 2x}{2}$.

Memorize this asap if you haven't yet, also $\sin^2 x = \frac{1-\cos 2x}{2}$. Notice that adding these equations leads to 1=1, which might help you remember them.

2) [30 points] FTTFF. A few people left some blank, but it doesn't hurt to guess at TF on my exams.

3a) [16 points] and 3b) [7 points]: Find the stationary point(s) from $0 = f'(x) = 2x - 4$. So, $x = 2$ is the only one, and $f(2) = -4$. Find the values at the two endpoints: $f(0) = 0$

and $f(3) = -3$. The 2 extreme values must be on this list of 3 values; -4, -3, 0. So the max is 0 at 0, The min is -4 at 2.

I do suggest sketching the graph to guide your thoughts, but this is not a good stand-alone method, and it doesn't work well at all in Calc 3.

3c) [7 points]: The range is $[-4, 0]$. It will be an interval of y values, from the min to the max (if f is continuous on a closed interval as in this example). A fairly common mistake in problem 3 was to ignore the given domain, $[0, 3]$ (the allowed values for x).

4) [20 points] Simplified, $y = 2x - 1$. Get $m = f'(1) = 2$, so from precalc, $y = m(x - x_0) + y_0 = 2(x - 1) + 1$. Etc.

Try to remember the shortcut formula $y = y_0 + f'(x_0)\Delta x$. The Calc 3 version (coming soon) looks more like $y = y_0 + \frac{dy}{dx}dx$. You may want to review this MAC 2311 topic now, if needed. Same remark goes for problem 3a (not so much for problems 1, 2 and 3c, though you will need the identities in 1).