BC.Q404.REVIEW ASSESSMENTS (PART 1)

THE EARLY CHAPTERS

(25 points)

NO CALCULATORS

NAME:

DATE:

BLOCK:

I (*print name*)________________________________ certify that I wrote and fully understand **all** marks made in this assessment. I did not write anything that I do not understand. I would now, having completed this assessment, be able to make similar (but equally accurate) responses if asked complete the same exact assessment on my own.

Signature:

1. Prove that $f(x)=\begin{cases}5+(1-x)^{5/2};\ x<1\\ 2x+3;\ x\geq 1\end{cases}$ is continuous at $x=1$. Definition Required.

2. Use Lagrange (*prime*) notation to express the following derivatives

A. $[f(g(x)+2)]'$

B. $[\ln(f(x))+g(2x)]'$

C. $[f^2(x)\cdot h(g(x))]'$

3. Let $f(x)=\begin{cases} 5+(1-x)^{5/2}\,;\, x<1 \\ ax+b\,;\, x\geq 1 \end{cases}$.

Find the values of *a* and *b* that make $f(x)$ differentiable at $x=1$.

4. Consider the curve $y + \cos y = x + 1$ for $0 \le y \le 2\pi$.

A. Find $\frac{dy}{dx}$ in terms of y.

B. Write an equation for each vertical tangent to the curve.

C. Find $\frac{d^2y}{dx^2}$ in terms of y.

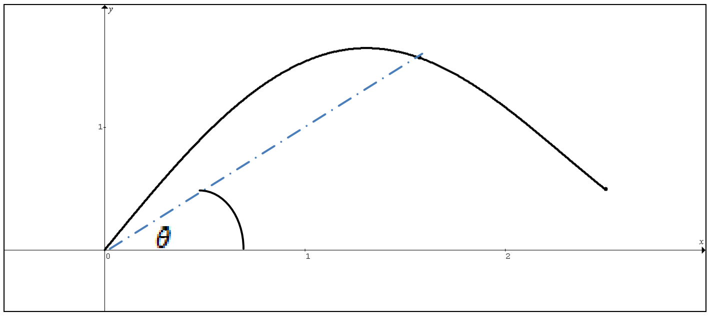
D. Discuss the concavity of the curve when $y = \pi$. Justify.

5. Consider the curve C: $\sin(xy)+2y=x+y^2+\frac{4-\pi}{4}$

A. Find $\frac{dy}{dx}$.

B. Find the equation of the line tangent to the curve at the point $\left(\frac{\pi}{4},2\right)$

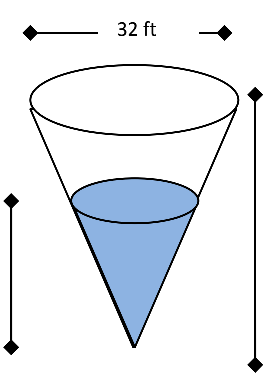
6. A particle moves from left to right along the curve $y = x + x\cos(x)$ in such a way that the x-coordinate increases at the rate of 8 m/s. How fast is the angle of inclination θ of the line joining the particle to the origin changing when $x = \pi/2$?



7. A conical water tank with vertex down has a radius of 16 ft at the top and is 24 ft high. Let r be the radius of the water surface and h be depth of the contained water.

If water flows out of the tank at a rate of $(h-1)$ ft^3/min, how fast is the depth of the water changing when the water is 10 ft deep? (Include units and Simplify)

Volume of a cone: $V = \frac{1}{3}\pi r^2 h$



8. Let $f(x) = x^3 + x + 5$ and $g(x)$ be the inverse function of *f*. Find $g'(15)$.

9. Let $f(x) = -x^5 - x^3 - x - 5$ and $g(x)$ be the inverse function of *f*. Find $g'(-2)$.

10. Find the derivative of $\sin^{-1}(2x^2)$