112-1 Calculus Quiz 2
Chapter: 3-8-5-6
Date: 2023/12/06 13:20-15:10 Total: 100 pts

1. Use the Mean Value Theorem to find $\lim_{x\to\infty}\{\sin\sqrt{x+4}-sin\sqrt{x}\}$. (10 pts)

2. $f(x)=x^{\frac{4}{3}}|x-1|, x\in R$, Find the local two(relative) extrema and points of inflection of $f(x)$. (10 pts)

3. Estimate the approximation of $\frac{\sqrt{4.02}}{2+\sqrt{9.02}}$ (approximate to at least four decimal place). (10 pts)

4. The radius of an inflating balloon A spherical balloon is inflated with helium at the rate of 100π ft^3/min. How fast is the balloon's radius increasing at the instant the radius is 5 ft ? How fast is the surface area increasing? (10 pts)

5. Let $f(x)=\frac{1}{x(x+2)}$ solve $f(x)=-x$ by Newton's method (approximate to at least one decimal place). (10 pts)

6. Find the following integrals (20 pts)
   a. $\int\frac{dx}{(1-sin^2x)\sqrt{1+tanx}}$ (10 pts)
   b. $\int\frac{(2r-1)\cos\sqrt{3(2r-1)^2+6}}{\sqrt{3(2r-1)^2+6}}dr$ (10 pts)

7. Find the area of the region enclosed by parabola $y=-x^2+4x-3$ and its two tangents at the points (0,-3) and (4,-3). (10 pts)

8. What values of a and b maximize the value of $\int_a^b(x-x^2)dx$? Explain your answer. (10 pts)

9. Find the linearization of $f(x)=2-\int_2^{x+1}\frac{9}{1+t}dt$ at $x=1$. (10 pts)