Homework Questions to replace 1.30-1.31

1. Linearize the given function at the given point:

   (a) $f(x) = \frac{1}{x}$, $a = 1$

   (b) $f(x) = \tan^{-1}(x)$, $a = 0$

   (c) $f(x) = \sqrt{x}$, $a = 9$

2. Approximate $\sqrt{220}$ using a linearization (in this case, you need to choose an appropriate base point, $x = a$)

3. Suppose that $f(2) = -2$ and $f'(2) = 3$. Give an approximation to $f(2.3)$.

4. The volume of a sphere is dependent on its radius,

$$V = \frac{4}{3}\pi r^3$$

   Linearize the volume at $r = 1$, and use it to approximate the volume when $r = 1.1$. Compare this with the actual volume if $r = 1.1$.

   Compare the actual and estimated volume if $r = 1.2$, and $r = 1.5$. Are the approximations getting better or worse?

5. Let $f(x) = x^2 - 3$. Find the $x-$intercept of the tangent line through the graph of f at $x = 4$.

6. Let $f(x) = 2\sin(x) - x$. Find the $x-$intercept of the tangent line through the graph of f at $x = \frac{\pi}{2}$.

7. Use Newton's Method to find the solution to the equation that is accurate to 5 decimal places:

   (a) $2\sin(x) = x$, $x > 0$

   (b) $\ln(x) = x - 4$, $x > 4$

   (c) $x^3 = 8 - 4x$