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Hw3

1. B. While both (i) and (ii) will converge to the true value as n(the number of summation terms) approaches infinity. Method (i) oscillates between positive and negative until it converges because of the negative number with an incrementing exponent. Method (ii) will converge quicker because it does not use a negative number with an incrementing exponent. Therefore, method (ii) is significantly more accurate with less summation terms.

3.

$x = \sqrt[r]{N} \qquad f(x) = x^r - N$

$x^r = N \qquad f'(x) = r x^{r-1}$

$x^r - N = 0$

$$x_{k+1} = x_k - \frac{f(x_k)}{f'(x_k)}$$

$$x_{k+1} = x_k - \left(\frac{x_k^r - N}{r x_k^{r-1}}\right) = \frac{x(r x_k^{r-1}) - x_k^r + N}{r x_k^{r-1}}$$

$$x_{k+1} = \frac{r x_k^r - x_k^r + N}{r x_k^{r-1}} = \frac{1}{r}\left[x_k(r-1) + \frac{N}{x_k^{r-1}}\right]$$

$$\boxed{x_{k+1} = \frac{1}{r}\left[x_k(r-1) + \frac{N}{x_k^{r-1}}\right]}$$