Practice Test 3

1. Find the amount after 3 years if $5,000 is invested at 5.5% compounded quarterly.

2. Find the derivative of:

a. $f(x) = \dfrac{\ln x}{x+1}$

b. $f(x) = x^4 \ln(x-3)$

c. $f(x) = e^x\left(x^3+5\right)$

d. $f(x) = \sqrt{e^x - 3x}$

3. Find the relative extrema of

$$f(x) = e^{\frac{-x^2}{2}}.$$

4. Use logarithmic differentiation to find the derivative of:

$$y = x^{\ln x}.$$

5. Evaluate:

a. $\int (3x^{\frac{3}{4}} + \dfrac{5}{x} + 2)dx$

b. $\int x\left(\sqrt{x} - 1\right)dx$

c. $\int 4e^{3-x}dx$

d. $\int \dfrac{x}{4x^2+2}dx$

e. $\int\left(\dfrac{1}{x^3} + \dfrac{1}{\sqrt{x}}\right)dx$

f. $\int \dfrac{\left(\ln x\right)^{\frac{3}{2}}}{x}dx$

6. Find f(x) if f ( 1 ) = 1 and

$$f'(x) = \frac{3x^2}{2\sqrt{x^3-1}}.$$

7. Approximate the area under $f(x) = \frac{1}{x}$ over the interval $[1,3]$ using four rectangles and right endpoints.

8. Evaluate:

a. $\int_0^1 \left(x^3 + 2x^2 - 4\right) dx$

b. $\int_0^2 xe^{-\frac{1}{2}x^2}\, dx$

c. $\int_1^4 \left(\sqrt{x} - x^{\frac{3}{2}}\right) dx$

d. $\int_1^e \frac{\ln x}{x} dx$

9. Find the area enclosed completely by the graphs of

$$f(x) = x^4 \text{ and } g(x) = x.$$

10. Find the average value of the function

$$f(x) = \frac{x}{\sqrt{x^2 + 16}}$$

over the interval [ 0 , 3 ].

11. Evaluate:

a. $\int x^2 \ln x dx$

b. $\int_0^2 xe^{-x} dx$