

review Test 1-Math 2242-Spring 08

Show all your work to get credit. No calculator!

1. Evaluate

(a) $\log_2 16$

(b) $\log_3 \frac{1}{27}$

(c) $\arcsin(\sin \frac{\pi}{6})$

(d) $\arccos(\cos(-\frac{\pi}{3}))$

(e) $(2^3)^2$

(f)

$$\lim_{x \rightarrow 1^+} x^{\frac{1}{1-x}}$$

(g)

$$\lim_{x \rightarrow +\infty} \frac{\frac{\pi}{2-x}}{\arctan x}$$

2. Differentiate

(a) $f(x) = \sin(\ln x)$

(b) $f(x) = \ln(x^2 \sqrt{x^2 + 1})$

(c) $f(x) = e^{\cos x}$

(d) $f(x) = x^{2x}$

(e) $f(x) = \log_2(\arctan x)$

(f) $f(x) = \arcsin(\cos x)$

3. Evaluate the following integrals:

(a)

$$\int \frac{dx}{x \ln(x^2)}$$

(b)

$$\int \frac{\sin x}{3 + \cos x} dx$$

(c)

$$\int \frac{e^x}{3 + e^x} dx$$

(d)

$$\int_0^1 (2^t + t^2) dt$$

(e)

$$\int_0^{\frac{\pi}{2}} \frac{\cos x}{1 + \sin^2 x} dx$$

(f)

$$\int_1^2 \frac{8dx}{x^2 - 2x + 2}$$

(g)

$$\int \frac{dx}{\sqrt{x}(\sqrt{x} - 1)}$$

(h)

$$\int \frac{x^2 dx}{x^2 + 1}$$

(i)

$$\int \frac{1 - x}{\sqrt{1 - x^2}} dx$$

(j)

$$\int \sin^3 x \, dx$$

(k)

$$\int_{-\pi}^0 \sqrt{1 + \cos t} dt$$

(l)

$$\int \ln x \, dx$$

(m)

$$\int_0^2 x e^x \, dx$$

(n)

$$\int x \sin\left(\frac{x}{2}\right) dx$$

4. Show that e^x grows faster than $3x^3 + x^2$
5. Which of f and g grows faster if $f(x) = \sqrt{x^4 + x^2 + 1}$ and $g(x) = 3x^2$?
6. The half-life of carbon 14 is 5700 years.
 - (a) What is the age of a sample that contains only 25% of its original carbon 14?
 - (b) Write the law giving the amount of carbon 14 left after t years in terms of the original amount A_0 .